

**A GUIDE
TO
LEPROSY
FOR
FIELD STAFF**

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A GUIDE TO
LEPROSY FOR FIELD STAFF

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A GUIDE TO LEPROSY FOR FIELD STAFF

FOREWORD

This presentation is a revision of "A SIMPLE GUIDE TO LEPROSY". It includes all that is necessary for medical and paramedical personnel to diagnose and manage MOST ORDINARY cases of leprosy in the field. DIFFICULT CASES will need experienced and skilled medical and nursing care, and a much greater knowledge of leprosy than it is possible to give in this book. Such cases should be sent to hospital.

Leprosy control activities are also essential in a full leprosy service. Principles and organisation for leprosy control will be published by ALERT in another book. This book is concerned with diagnosis and management in the field, which is the first essential in leprosy control.

Health education is also essential in the management of leprosy patients, and their families. Detailed instructions on health education can be found in the booklet "A GUIDE TO HEALTH EDUCATION IN LEPROSY", also published by ALERT.

Proper footwear is also essential in the management of leprosy patients if wounds and deformities are to be prevented. Detailed instructions on design, selection and construction of footwear suitable for leprosy patients will be published by ALERT in another book.

All these publications use a vocabulary suitable for those with English as a second or third language.

These publications have not been copyrighted. Supervisors of leprosy services are encouraged to translate them into local languages. Credit, by means of a footnote at least, should be given to ALERT if the contents are reproduced, whatever the language. ALERT would appreciate receiving copies of any translations or other reprintings of any parts of its publications. These will be valuable for use by trainees coming to ALERT.

STATEMENT OF ACKNOWLEDGEMENTS

While the text of the original book, "A SIMPLE GUIDE TO LEPROSY", and this revision titled "A GUIDE TO LEPROSY FOR FIELD STAFF" is mine, the publication is, in a broader sense, a contribution of ALERT staff as a whole.

Valuable suggestions for the content have come from Peter Hill, Ellen Davis Kelly, Jane Neville, Jean Watson, and indirectly from the many students who have come to ALERT for training and have used "A SIMPLE GUIDE TO LEPROSY".

For photographs and other illustrations, appreciation is expressed to Jane Neville, Dennis Ottoway, Ernest Price, Reno Rimondi, and Una Ross.

Criticisms of the manuscript by ALERT physicians Van Joffrion, John Pearson and Harold Wheate have led to numerous improvements.

The expenses of publication have been borne by the 25 voluntary agencies which collectively are the sponsors of ALERT. To them I am grateful.

For typing of the various drafts and the final manuscript I am indebted to Barbara Hill, Efrat Tooms, and Elizabeth Asfaw.

For putting the manuscript in final form for publication, credit should go to Ellen Davis Kelly.

You, for whom the book has been written are now expected to "read, mark, learn, and inwardly digest" it, and to use your talents in service to leprosy patients.

W. Felton Ross
Director of Training

Addis Ababa

Ethiopia

August, 1975

This book is written for those who have responsibility in helping to control leprosy by caring for leprosy patients in outpatient clinics. It does not attempt to cover the whole field of clinical leprosy. But it does have some **specific objectives**.

Simply **reading** this book will not make the reader skilled to carry out all the tasks it describes. This requires **practice**. But after careful study of this book:

- A. **The beginner** will have a good foundation on which to learn to **practise**, under supervision.
- B. **The experienced** person who already has some practical skills in history taking and clinical examination will be able to apply those skills immediately with leprosy patients.

A. THE BEGINNER'S OBJECTIVES

After careful study of this book, the **beginner** will be able to:

- (1) **DESCRIBE** how to take and record a case history.
- (2) **DESCRIBE** how to carry out a physical examination for purposes of diagnosis and treatment of leprosy.
- (3) **LIST** the criteria by which cases of leprosy can be classified (a) clinically, (b) by deformity grade, and (c) by degree of activity.
- (4) **DESCRIBE** how (a) to recognise reactions, (b) to name the different types of reactions, and (c) how these different types of reaction should be treated.
- (5) **DESCRIBE** drug treatment of leprosy.
- (6) **DESCRIBE** how to (a) recognise, and (b) take care of complications of leprosy in the field.
- (7) **LIST** the conditions which need to be referred to hospital.
- (8) **LIST** the conditions for which reconstructive surgery, if available, may be helpful.

THE BEGINNER WILL THEN BE READY TO GO OUT INTO THE FIELD WITH AN EXPERIENCED WORKER TO GAIN THE SKILLS TO PUT HIS LEARNING INTO PRACTICE.

B. THE EXPERIENCED PERSON'S OBJECTIVES

After study of this book the reader with previous medical or paramedical training and skill in history taking and clinical examination will be able to:

- (1) **Take** and **record** a relevant history, and carry out and record the findings of a physical examination, missing no significant signs.
- (2) **Classify** cases (a) clinically, (b) by deformity grade, and (c) by activity.
- (3) (a) **Recognise**, (b) **name**, and (c) **treat** reactions.
- (4) **Treat** leprosy cases for leprosy.
- (5) **Treat** complications of leprosy.
- (6) **Refer** cases which need and should benefit from hospital care to hospital.

THE EXPERIENCED WORKER SHOULD BE ABLE TO DO HIS JOB BETTER, AND BE READY TO LEARN TO TEACH OTHERS.

Section 1 DEFINITION AND DESCRIPTION OF LEPROSY

DEFINITION OF LEPROSY

Leprosy is a chronic infectious disease of man. It mainly attacks nerves and skin. It can be diagnosed, and usually can be cured with no damaging after-effects, but only if it is recognised early and treated properly. If left untreated it may cause severe physical disabilities. It is often the cause of severe emotional distress to patients and their families, and may also seriously disturb their social life.

EXPANSION OF TERMS USED IN THE DEFINITION
Chronic. A chronic disease is one which begins very slowly and lasts for a long time. This is certainly true of leprosy. It is often present long before its symptoms are noticed by the patient, by his companions, or by medical workers. It requires years of treatment to cure.

Infectious. An infectious disease is one which can spread from a person with the disease to another person who has not yet got it. Most infectious diseases are due to bacteria or viruses. The bacterium which causes leprosy is called **MYCOBACTERIUM LEPRAE** (*M. leprae*, for short). In some but not in most patients, *M. leprae* can be found in skin, in nerves, in muscles and in the patient's mouth, nose and throat.

It is not known exactly how leprosy spreads. However, one leprosy patient can not infect another person unless living *M. leprae* can get out of the patient's body and into the other person's body. Fortunately, not all leprosy patients have large numbers of living *M. leprae* in their mouths or noses, or other places from which the bacilli may get out. Probably no more than 5% to 15% of leprosy patients can spread the disease. Also, it is known that most people are able to kill any living *M. leprae* which may get into their bodies. They kill them before they can multiply enough to cause the disease. These people—most people in fact—have very high resistance to *M. leprae*, and therefore it is not possible for them to get

the disease of leprosy. People with high resistance do not get the disease even if they have close contact with leprosy patients for many years. Although leprosy is an infectious disease, few contacts (even of infectious cases) develop leprosy. It is much less infectious than many other diseases, for example smallpox.

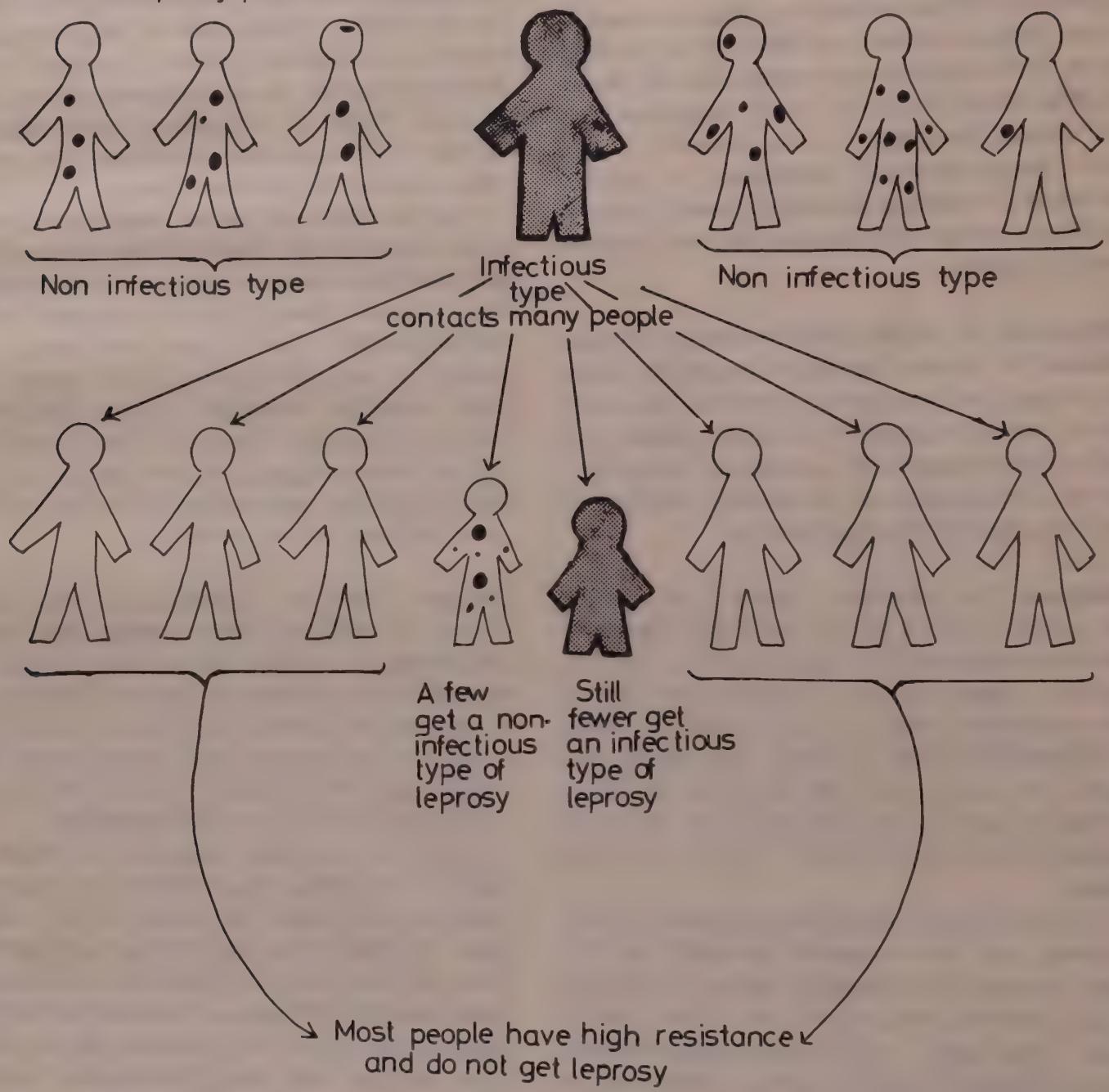
Once a patient is taking regular drug treatment, most of the bacilli in his skin, mouth, and nose are quickly killed by the treatment. The treated patient quickly becomes **NON-INFECTIOUS**. This is true even though the patient is still not cured of his leprosy and must continue treatment for a long time. Patients on regular treatment cannot give leprosy to other people. They do not need to be kept away from other people, but they do need to continue their treatment.

Disease of Man. Man himself is the only known source of infection with leprosy. This means that living *M. leprae* must go directly from one human for the disease to spread. Therefore, if all the people with leprosy in any country could be found and treated early, then no one else would catch the disease. This is the aim of **LEPROSY CONTROL PROGRAMMES**.

What has just been described is shown in Fig. 1.1. On the top row are shown seven leprosy patients who might be found in any village. Some of them have only a few skin patches. They are not infectious. Only the middle gray figure has live *M. leprae* in his mouth or nose, or other places from which they may get out of the body, and go, still alive, into another person. Only this one patient can infect others. On the second row are all the people with whom this one infectious patient comes into contact. Most of these people will have such high resistance to *M. leprae* that their bodies kill off any live *M. leprae* which might enter them. Only the very few people who lack complete resistance will get leprosy from that one infectious case. Most of these will, fortunately, have the non-infectious

Figure I.1

Seven leprosy patients - six non infectious - one infectious (gray)



type. This shows again that leprosy is not easily caught by other people. But it also shows that we must find and treat every infectious case if we hope to completely get rid of leprosy.

Mainly Attacks Nerves and Skin. Leprosy can be called "a disease of nerves which shows itself in the skin". The attack on nerves may occur at any time. In some patients nerve damage is the first sign of leprosy. In other people it does not happen until months or years after skin patches have first appeared. In still others it may occur during treatment. The speed with which the nerve damage occurs also varies. In some cases it is (1) so slow that the patient hardly notices it, in others it is (2) very sudden indeed. The chances of recovery and the speed of recovery from nerve damage also vary from case to case. Recovery may occur in (1) a few days, or (2) two to three weeks, or may take (3) three to four months, or it may (4) not occur at all. In all cases it is of great importance to recognise nerve damage as soon as possible, and to treat the nerve damage as soon as possible. Early treatment gives the best possible chance of recovery of the nerves and of prevention of later deformity. You will learn how this is done. You will find an explanation of the way nerves function, and the way leprosy damages nerves at the end of this section.

Other Organs Damaged by Leprosy. Besides attacking nerves and skin, leprosy may attack other body organs. The most important of these is the eye. The eye can be attacked in three different ways. (1) The muscles which control the eyelid can become paralysed. Then the patient cannot close or "blink" his eye to keep the eyeball wet and healthy. Then it easily becomes infected. (2) The outer covering of the eyeball and the linings of the eyelids may lose feeling. Insensitive eyes may become damaged and infected without the patient knowing it, because he does not feel pain. (3) *M. leprae* may also attack the inside of the eyeball.

Leprosy patients with trouble in their eyes are difficult to care for. Blindness in leprosy patients

is a double tragedy. Often these patients can neither see nor feel. This tragedy can often be prevented by frequent re-examinations, and early treatment.

In some types of leprosy the nose, throat, breasts, and testes may also be damaged. Further details are found in Section 2.

Severe Physical Disability. Only a few of the serious disabilities seen in leprosy patients are due directly to primary damage done by *M. leprae*. Most of the disabilities are due indirectly to secondary injuries to hands or feet or eyes which have lost their feeling. These injuries occur in the course of ordinary daily activities such as cooking, working and walking. These secondary disabilities can be prevented if patients will care for their hands, feet and eyes. They must be taught how to take this care. Instructions are given in the ALERT booklet called A GUIDE TO HEALTH EDUCATION IN LEPROSY.

Diagnosis. It is fairly easy to recognise leprosy. Many cases of leprosy are diagnosed by the patient himself or by his relatives or neighbours. This proves that diagnosis is easy. But unfortunately too many people do not try to get treatment when they see the first signs. They wait until they notice some complication or secondary deformity. Of course patients, relatives and neighbours sometimes make mistakes in diagnosis. Unfortunately, also, some people who do not have leprosy are thought by friends and the community to have leprosy because they have some skin symptoms which may look somewhat similar to leprosy.

Leprosy Can be Cured. Early diagnosis with early, regularly and long continued treatment can cure most cases of leprosy, and prevent most damage and deformity. It is important to convince all people in a community of this, not just leprosy patients. But everyone must also understand that drug treatment can do very little to cure insensitivity and deformity after they have occurred. Unless people also understand this, they will be disappointed when they see that

insensitivity and deformity which patients had before they started drug treatment do not disappear. Then people will not believe you when you tell them that leprosy can usually be cured. Drugs can cure the disease, but not the damage and deformity which have already occurred.

Importance of Correct Diagnosis. If a wrong diagnosis of leprosy is made, the patient may be labelled with leprosy for the rest of his life. Some of the signs which were mistakenly thought to be due to leprosy cannot be cured with leprosy treatment or by any other kind of treatment. When such patients do not get any better with leprosy treatment, people think their leprosy is incurable. This must never happen. It can be avoided by following the routine for examination given in Section 2. If in doubt, do not make a diagnosis of leprosy. Be willing to admit that you do not know. Wait until you can get the advice of someone with more training and experience before making a diagnosis. If no-one is available, see the patient again in three months. Time alone will usually make the diagnosis clear.

Social Disability. In most communities or cultures, people fear leprosy very greatly. This is partly because of the severe secondary deformities which so often have been allowed to result from it. But mostly people also fear leprosy because the cause of leprosy was not known until recently. Most people still do not know the cause of leprosy. And the way leprosy spreads is still not clearly understood.

Because of these fears, the leprosy patient is often rejected by his family. He may be turned out of his home by his family, and out of his village by his neighbours. The patient often does not complain when this happens. Frequently he simply accepts this rejection. He may even help this rejection by taking himself away from his village and family, thinking that he must go away to protect his family.

Such a patient quickly learns to expect nothing from society except insults, and help given in an insulting way. He often does not show how he feels about the way he is being treated. He may

simply hide his feelings and become, outwardly at least, passive and uncomplaining. He becomes unable to fight for his own rights. He very easily gives up if real or imagined difficulties are placed between himself and what he would like to do. Such a patient may make only half-hearted attempts to obtain treatment. He may come once or twice to a clinic. But often he will not continue to come if any difficulties arise, particularly if the staff of the clinic are not sympathetic to his problem and are not willing to help him. Then his treatment is not regular and continued long enough to cure him.

Sooner or later some patients lose all sense of self-respect. They no longer keep themselves clean, or bother to care for their injuries. They may even deliberately injure themselves, once they learn that the worse they look, the more money they will receive if they beg.

Health workers find it very difficult to reverse this process, and to help a patient restore his self-respect and self-confidence. It takes much more than simply giving him medicine regularly. It requires a great deal of patience and kindness on the part of the clinic health worker. He must be willing to give the leprosy patient not one, but many opportunities to begin again. His attitude of "caring" is best summarised in the rule "love your neighbour as yourself". Workers with this attitude will respect their patients as people. Patients are very sensitive to the way other people feel about them. They know whether the clinic workers respect them or not. Respect by the worker for his patients helps patients to respect themselves once again. Unless patients do respect themselves, they cannot be expected to take the time and to make the effort required to get treatment regularly for the many years necessary to be cured.

SUMMARY OF DEFINITION

There are drugs which can cure leprosy. But we cannot cure leprosy cases unless people know that there is a cure, and unless they will come to clinics to be treated. So it is very important that leprosy workers teach everyone, not just people with leprosy, but also their neighbours, school

children, and employers—in fact everyone. Teach them that (1) there is a drug which can cure leprosy, (2) that at least 80% of all people cannot get leprosy, (3) that six out of seven leprosy cases are NOT infectious to others, (4) that infectious cases can become non-infectious after approximately six months of regular drug treatment, and (5) that early diagnosis and early treatment could prevent most deformities.

When everyone really believes these truths about leprosy, it will be far easier for leprosy workers to treat leprosy, and to control the spread of leprosy. You can start the circle shown in Fig. 1.2 by your teaching in a community.

NERVE FUNCTION

A brief discussion of the way nerves function will help to explain the nerve damage which *M. leprae* sometimes causes in untreated cases.

In Fig. 1.3, the left side shows the brain and the spinal cord, which are part of the central nervous system. They are inside the bones of the skull and the spinal column. Fortunately, leprosy never damages the brain and spinal cord.

The middle of Fig. 1.3 shows the large nerve trunk going off from the spinal cord. *M. leprae* sometimes damage nerve trunks, particularly those to the hands, feet, and eyes.

This nerve trunk shows the three types of nerve fibres which are found in most nerve trunks: (1) sensory, (2) motor, and (3) autonomic. Actually there are thousands of such nerve fibres in a large nerve trunk, and there are a very large number of nerve trunks, such as this one, going out from the spinal cord. They go to every part of the body. The nerve fibres send "messages" between all parts of the body by means of very small electrical currents.

(1) **Sensory fibres** carry "messages" from the skin in towards the spinal cord and the brain. These "messages" make it possible for us to feel (1) light touch, (2) pressure, (3) heat, (4) cold, and (5) pain. Because of these "messages" we learn to recognise what our hands, feet and other parts of the body touch. Then we know when our bodies are in danger of being damaged.

(2) **Motor fibres** carry "messages" out from

the brain and spinal cord out to all the large muscles in the body. We can control these muscles by our thinking. We start these "messages" any time we decide to move our muscles to do something.

(3) **Autonomic fibres** control the circulation of blood in the skin and the production of sweat from the sweat glands. They keep the skin moist and healthy. They have other functions not of direct importance for leprosy.

Sites of Attack by *M. leprae*. Leprosy may attack nerve fibres at two different sites; skin and nerve trunks. This is shown in Fig. 1.3.

Site 1—Skin. If *M. leprae* attack nerve fibres in the skin only, they attack both the sensory fibres and the autonomic fibres. This means that the patient will have two different complaints of symptoms. (1) The patient will lose some or possibly all of his sense of feeling because of damage to sensory nerve fibres. (2) The skin will become dry and the blood supply will be poor, as a result of the damage to autonomic nerve fibres.

Because these signs are the direct result of *M. leprae* multiplying in the nerve fibres, they are called **primary damage**. There will be no loss of muscle strength or paralysis of movement from damage at Site 1. Other diseases besides leprosy show skin patches which may look like leprosy. But skin patches which also show at least some loss of feeling are only seen in leprosy. This is why it is important for the medical worker to examine each patient for loss of feeling. If he does not examine carefully, he may fail to notice the loss, because often the loss is only partial, not complete. Compare the feeling in the skin patches with that of normal skin on the other side of the patient's body (see Section 2, "Loss of Feeling"). Nerve fibre damage at Site 1—Skin is usually the first kind of damage in leprosy. If it is recognised and the leprosy is treated at this early stage, the patient may be saved from further, and more serious, damage.

Site 2—Nerve Trunks. If *M. leprae* attack nerve fibres at Site 2, the nerve trunk, they usually

Figure 1.2

telling
THE TRUTH ABOUT LEPROSY

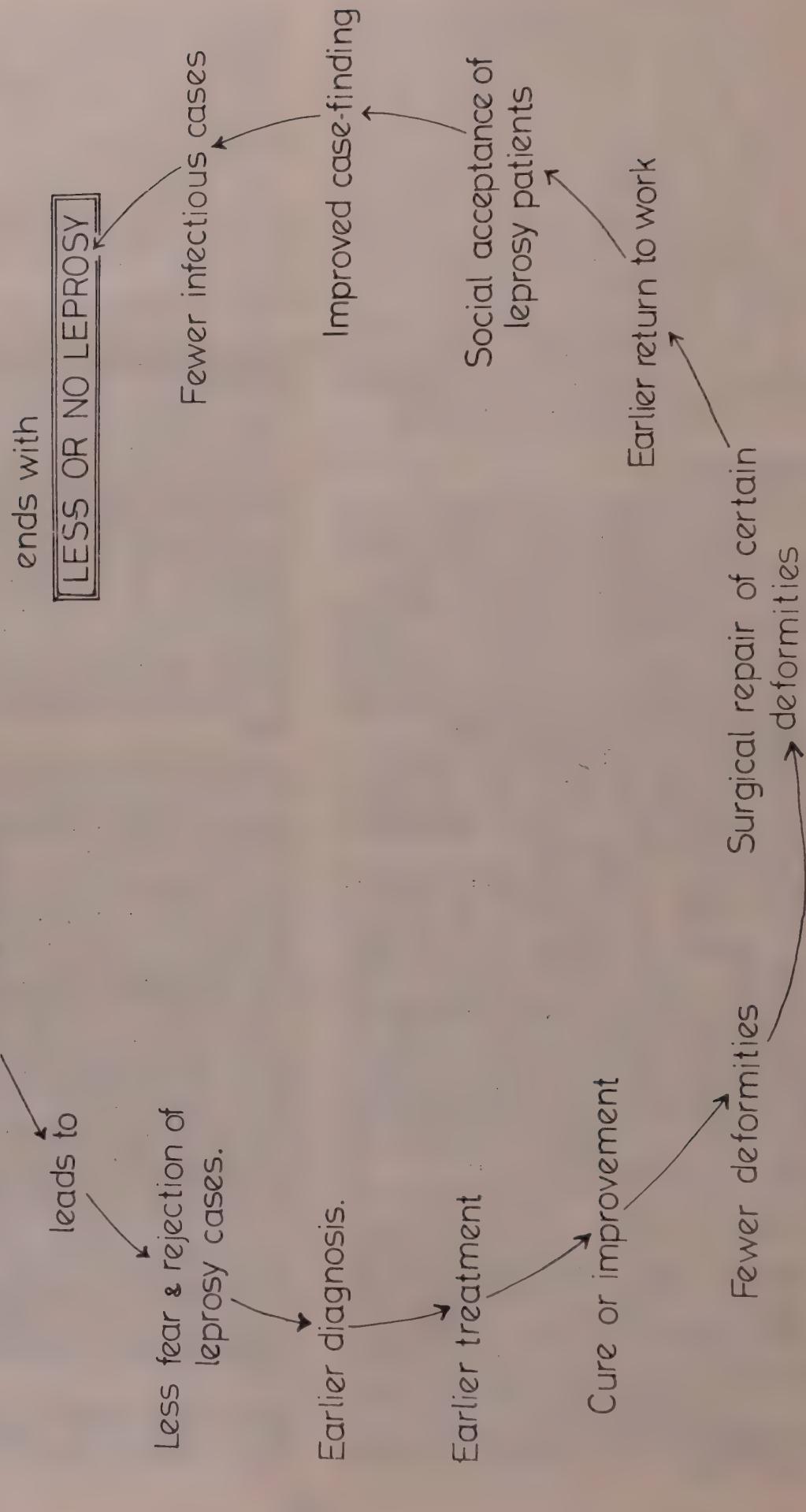
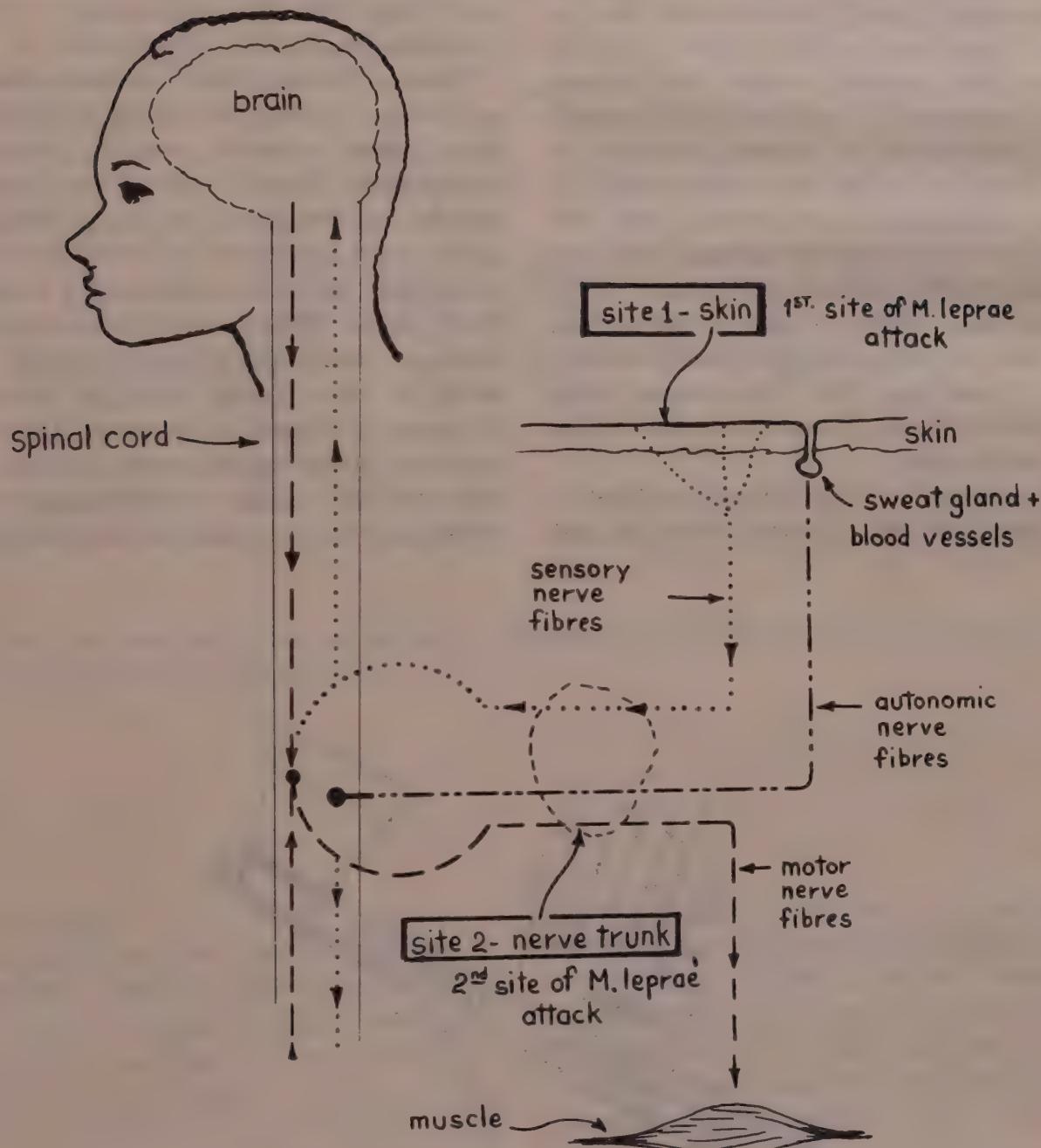


Fig.1.3 Leprosy Attacks Nerves at 2 Sites

1- Skin

2- nerve trunk



KEY

.....	sensory nerve fibres.
— — — — —	motor nerve fibres.
...	autonomic nerve fibres.

attack not only sensory fibres and autonomic fibres but also motor fibres. The patient will then have a third complaint or sign. As at Site 1, (1) the patient will lose some of his sense of feeling in the areas of skin supplied by the sensory nerve fibres, and (2) the skin will also become dry in the area supplied by the autonomic nerve fibres. But now with motor fibre damage the third complaint (3) will be loss of muscle strength, accompanied by thinning or wasting of muscles. These three signs are a direct result of *M. leprae* multiplying in the nerve trunks. All three signs are called **primary damage**. They can only be prevented by early drug treatment.

Because there is loss of feeling, the patient feels no pain and may damage himself without knowing it (see Fig. 1.4). The patient often neglects these injuries because he often does not even notice them.

Muscle weakness may also force the patient to use his hands and feet in ways which are not

normal and which increase damage (see Fig. 1.5).

In addition, if joints are not moved through their entire normal range of motion because muscles are weak, then the skin and ligaments over the joints become shortened. Then the joints get stiff. This shortening is known as a **contracture** (see Fig. 2.5 in Section 2).

When all three types of primary damage (insensitivity, dryness and muscle weakness) occur, then cracks, injuries, wounds, infection and contractures usually follow. These later kinds of damage are not due to *M. leprae* directly. They occur when patients do not learn how to protect hands and feet after the primary damage done by *M. leprae*. They are therefore called **secondary damage**. Secondary damage includes anything which is not a direct result of the attack of *M. leprae* on tissues of the body. The secondary infection, which so frequently follows injury, is also the main cause of shortening or loss of fingers and toes, and also the eye damage.

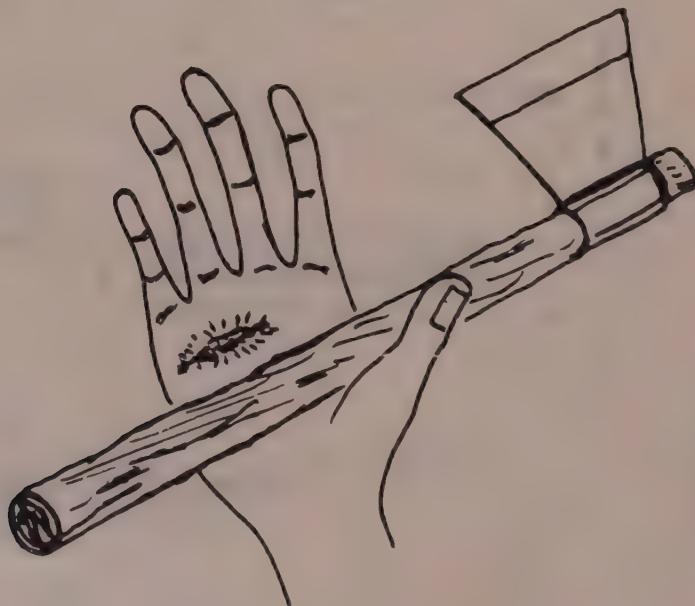
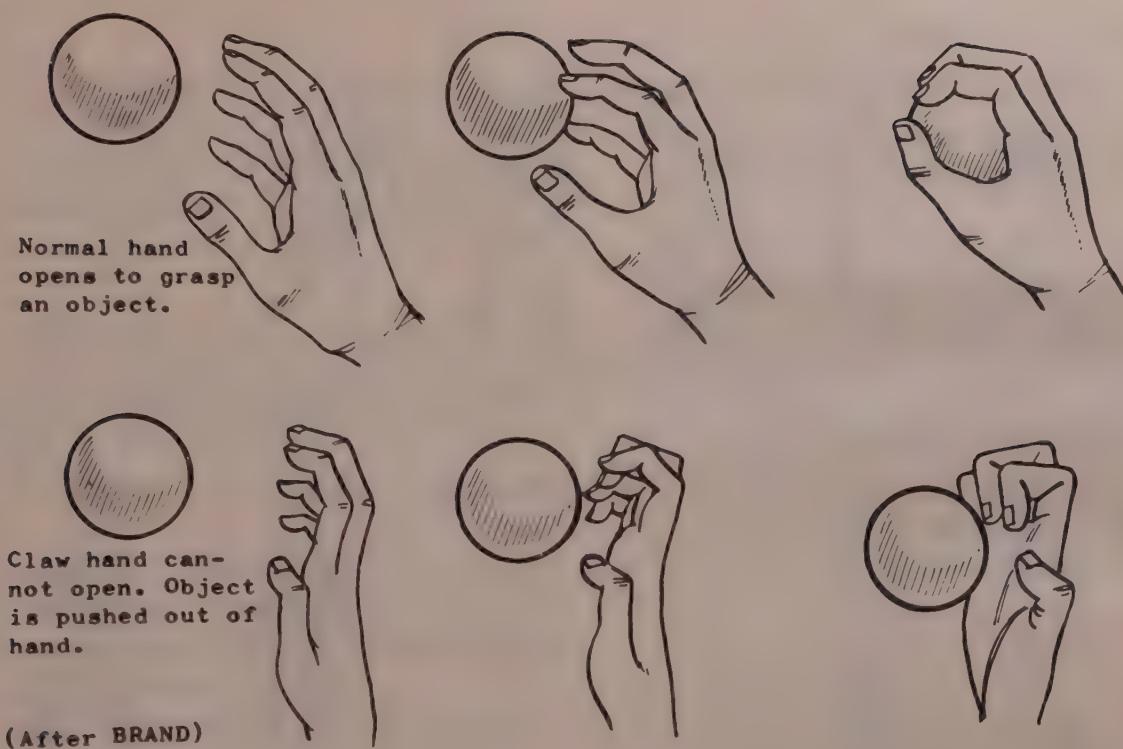


Figure 1.5 Normal and Claw Hand



Muscle weakness may also force the patient to use his hands and feet in ways which are not normal and which increase damage (see Fig. 1.5).

CAUSE OF INJURIES

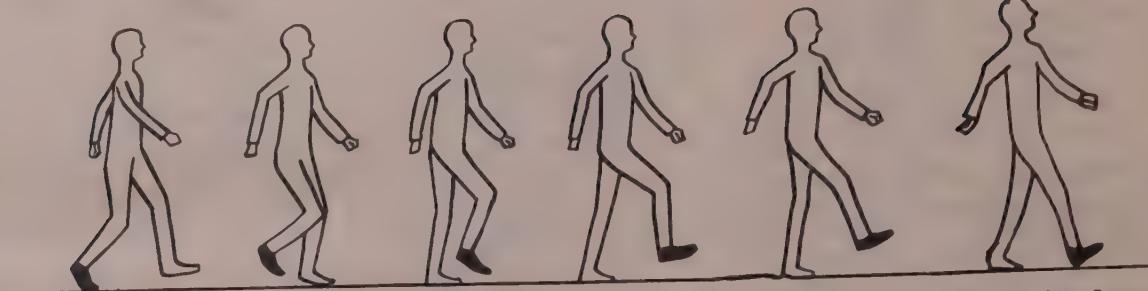
Injuries to hands and feet which have loss of feeling, dryness, paralysis, can occur in many different ways. For example patients with claw hands are unable to grasp an object with the whole palm and the fingers as a normal hand does (see Fig. 1.5). Instead they hold the object only with the tips of the fingers. Then great pressure is put on the finger tips. Blisters, and even ulcers, may result. (You can prove this to yourself by getting a patient with a claw hand to grasp your own wrist firmly. You will feel the pressure of his finger nails and finger tips.)

In the same way, nerves in the leg which normally move the muscles which lift the foot during walking may be damaged. Lack of muscle

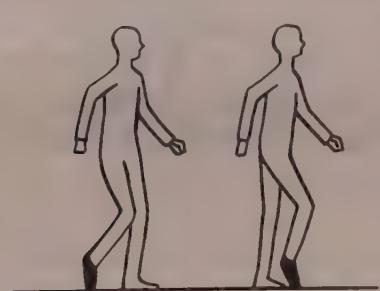
power results in an obvious deformity called foot-drop (see Fig. 1.6). This is primary damage. If the foot is allowed to remain dropped, skin and ligaments at the back of the ankle become shortened and the joint becomes stiff. The patient then has developed a contracture. This is secondary damage, which might have been prevented.

When the patient with sensory loss, foot-drop and contracture walks, he walks in a very abnormal way and will certainly injure the front of his foot. These injuries lead to infection, loss of toes, and even complete loss of the foot. Paralysis also affects the foot in other ways. These are discussed in more detail in Section 2, "Examination of Feet and Shoes".

Figure 1.6 Walking

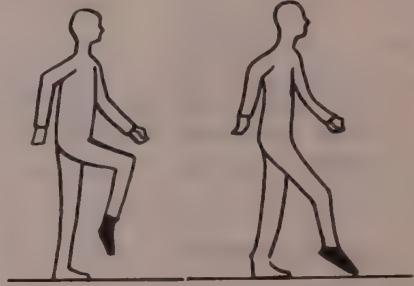


Normal Walking. When we walk, we pick a foot up behind us and swing it forward. We bend the foot up in front, and put it down heel first. The leprosy patient with foot drop cannot do this.



Foot Drop Walking. The patient will drag his toes along the ground.

O R



O R

The patient lifts his knee very high, and his toes come down first.

Section 2 HISTORY AND EXAMINATION OF LEPROSY PATIENTS

A diagnosis, or recognition, of leprosy usually has severe personal and social results for the patient. To avoid errors, such a diagnosis must always be based on (1) the history given by the patient, and on (2) careful examination of the patient.

PURPOSES OF THE HISTORY AND EXAMINATION

The purposes of taking a history and doing a physical examination of possible leprosy patients are:

- (1) To make an accurate diagnosis, neither missing cases nor overdiagnosing cases.
- (2) To classify cases (a) into clinical groups and (b) by deformity groups.
- (3) To recognise reactions, and other complications.
- (4) To recognise whether cases are active or inactive.
- (5) To treat cases correctly.
- (6) To follow up cases to know whether the treatment is effective or not.

Records

Clearly, a record must be kept both of the history and of the physical examination findings. These records should be written up as the history and examination are being done, or immediately afterwards.

The records must include all the information necessary to fulfil the six clinical purposes listed above. In addition patients' records are essential for collection of statistics required in leprosy control programmes.

History Taking

To take a history you need (1) patience on your part, (2) a private place where the patient's entire skin can be examined, and (3) records. You must set the patient at ease, and give him confidence that his words will not be criticised, made fun of, or shared with unauthorised people.

Steps in History Taking (Method)

- (1) Greet the patient politely, ask about his family, etc., if this is the custom in your locality.
- (2) Collect and record identification data, particularly name, birth place, ethnic or racial group, sex, date of birth and address.
- (3) Collect and record social data, particularly other leprosy cases in the family, marital status, education, occupation past and present, living conditions, income, home to clinic distances and travel time.
- (4) Collect and record the patient's main complaints. Include:
 - a) date of onset
 - b) site of onset
 - c) initial description
 - d) subsequent changes and development
 - e) treatment received
 - f) immediate reason for coming for help now.
- (5) Collect and record other matters which may be a problem to the patient, or make it difficult for him to attend for treatment regularly and for a long time, such as other diseases he may have.

Physical Examination

Making a good physical examination is a difficult art. Learn how to use your eyes, hands and ears to collect the information you need. It has been said "We only see what we look for". Therefore learn what to look for.

Physical examination should be done, if at all possible, in a private and well-lighted place.

You will need cotton wool, and a pocket torch, in addition to record forms.

There are five special groups of signs to look for in possible leprosy. These are signs in: (1) skin, (2) nerves, (3) hands, (4) feet, and (5) eyes. These signs are described in detail in the following pages.

GENERAL PHYSICAL EXAMINATION

To make sure that you do not miss any important signs, you must examine patients in a systematic way. A well-tried system is as follows:

(1) With the patient sitting down, examine:

a) Head from the front:

 Forehead—Eye brows

 Eyes —see Fig. 2.8

 Nose —inside as well as outside

 Mouth —inside as well as outside

 Chin

 Cheeks

 Ears

 Neck

b) Chest and abdomen

c) Arms:

 Upper arm

 Forearm

 Wrist and hands

 Finger nails

 Palms and finger tips

 Thumb.

(2) Ask the patient to stand up and turn around. Examine:

a) Head from behind—ears from behind, and scalp

b) Shoulders

c) Waist

d) Buttocks (hips)

e) Legs

f) Soles of feet.

(3) Ask the patient to sit down again.

Examine:

a) Front of the thighs, knees, legs, ankles, feet

b) In male patients only, examine the genitalia (private parts).

1. Skin:

(1) changes in appearance

(2) loss of feeling

(3) presence of bacilli (see Fig. 2.1).

2. Nerves:

(1) size, shape and texture (hard or soft?)

(2) tenderness (see Fig. 2.2).

3. Hands:

(1) loss of feeling

(2) dryness

(3) skin damage

(4) muscle weakness or paralysis

(5) deformity.

4. Feet:

(1) loss of feeling

(2) dryness

(3) skin damage

(4) muscle weakness or paralysis

(5) deformity.

5. Eyes and Eyelids:

(1) pain

(2) changes in vision

(3) loss of feeling

(4) inability to close eyes

(5) redness

(6) changes in the cornea.

Details of the examination of each of the above five parts are given below. The importance of the findings of the examination and the need of keeping very good records will be considered in greater detail in Section 3, "Description of Different Kinds of Leprosy". Suggestions for care of the patient will be found in Sections 4, 5, and 6.

SPECIAL PHYSICAL EXAMINATION

Always examine each patient fully before making a diagnosis of leprosy. Look for the following:

1. EXAMINATION OF SKIN

Appearance. Skin is easy to examine. Both look and feel. (1) Look carefully in a good light, and in a private place where clothing can be removed so that the skin of the entire surface of the body can be seen. (2) It is also possible to get much important and necessary information by feeling the patient's skin. We should not fear to touch patients, because *M. leprae* are deep INSIDE the skin, not on the surface of the skin. It is extremely unlikely that living leprosy bacilli can get out of a patient's skin unless he has a wound. It is also unlikely that bacilli can get in through healthy skin of a person who does not have leprosy. In any case, bacilli would remain on the skin surface for some time, and the examiner could easily wash them off with soap and water. It is not possible to do a good examination of a patient without touching him.

Look carefully at the skin for patches. (An explanation of terms used to describe skin patches or lesions is shown in Fig. 2.1). The patches may be (1) completely flat, or nearly level with the rest of the skin, or they may be (2) slightly raised, or even (3) markedly raised. Patches may be of almost any size or shape, from very small to larger than a person's wide open hand. They may be found anywhere on the patient's body. Note whether patches are seen in the same area on the two sides of the body. Such patches are called symmetrical. Skin attacked by *M. leprae* is sometimes thinner and more easily damaged than normal skin, particularly on palms and soles. Look for such skin. Look and feel also for skin which is thicker than normal, and for hard lumps in the skin.

Colour changes. Usually skin patches are somewhat paler than normal skin, but they are never completely white. Many of the older patches have dark, rather normal looking centres. These are called healing centres.

Redness (erythema) is often found. It may be either at the edge of the patch or all over it. Erythema is a sign of bacterial activity in the patch. It is seen in untreated cases where the

disease is still spreading, and usually subsides after a few months of treatment. It is also seen in cases in "reaction". These may be seen in treated or untreated cases (see Section 4).

Loss of Feeling. Patches due to leprosy will have lost some degree of feeling. Many diseases other than leprosy show skin patches. But patches with some loss of feeling should immediately suggest leprosy to the examiner. The loss of feeling may be very slight, particularly early in the disease. It is most unusual for loss of feeling to be complete. Therefore, feeling must be tested with something soft and with a fine point, such as cotton wool or a feather (see Fig. 2.2). Normal skin will easily feel a light touch with a few threads of cotton wool, except on hands or feet hardened by heavy work, or by walking, or by scars.

Test for Loss of Feeling. First touch the normal skin of the patient with a few threads of cotton wool rolled up into a point (see Fig. 2.2). Let the patient watch you with his eyes open. Ask the patient to touch the same spot. Repeat this several times on normal skin, but with the patient's eyes closed, until you are sure that he understands that he is to touch with his finger the same spot which you touch. Now with the patient's eyes still closed, touch the patient's skin in the patches where you think he may have loss of feeling. If he does not point to the spot, you will know that he feels nothing. He therefore does have loss of feeling. Repeat this several times. If you think the patient is trying to deceive you by looking, then he should have something wrapped over his eyes so that he cannot see. Compare the patient's response in the areas with some loss of feeling with his response in the same area on the opposite side of his body. On the examination records, indicate the areas with lost feeling.

Patients with early leprosy may show only patches with some loss of feeling and no other nerve involvement.

Looking down
onto the skin

Patches have a:
EDGE
BORDER
CENTER



Macule flat or almost flat.

Looking at
cut edge of skin



Macule with central healing.



Macule and Satellite lesion,
separated from main lesion by
an area of normal skin.



Plaque (Rather sharply raised
edge).



Plaque with "punched out" area.



Infiltration



Nodule (rounded dome shaped).



Fig.2.1 Terms used to describe skin patches or lesions.

Loss of Feeling: Patches due to leprosy will have lost some degree of feeling. Many diseases other than leprosy show skin patches. But patches with some loss of feeling should immediately suggest leprosy to the examiner. The loss of feeling may be very slight, particularly early in the disease. It is most unusual for loss of feeling to be complete. Therefore, feeling must be tested with something soft and with a fine point, such as a cotton wool or a feather (see Figure 2.2.). Normal skin will easily feel a light touch with a few threads of cotton wool, except on hands or feet hardened by heavy work, or by walking, or by scars.



Fig. 2.2 *Loss of feeling*. A fine point of cotton wool is used to test for loss of feeling in a typical flat patch (macule) on the cheek.

Presence of Leprosy Bacilli in the Skin. The bacilli will be IN the skin, not on the surface of the skin. A skin smear may be taken in the field or in a laboratory.

Steps in Taking Skin Smears.

1. Smears should be taken from:

Right ear	Left arm	Back
Left ear	Right leg	

(In lepromatous cases, take smears from the most obvious lesions. In tuberculoid cases, take smears from the edges of patches. In borderline cases, take an extra smear from clinically normal skin (see Section 3).

2. Clean the skin where the smear will be made, using spirit on a swab of cotton and allow it to dry.
3. Pinch up the skin to compress it and stop any bleeding.
4. Make a cut 5 mm long and about 2 mm deep, that is, just below the epidermis.
5. Without releasing your pinch, turn the blade at right angles to your cut, scrape out a little tissue fluid or pulp. If there is any bleeding, wipe blood away before you scrape.
6. Put the smear material onto a clean new slide, making a fairly thick smear.

7. Heat the back of the slide with a match flame until the slide is just too hot to keep touching your hand.
8. Mark the slide (or the paper in which it is wrapped) with the name and/or number of the patient.
9. Store it carefully until it can later be stained and examined in a laboratory.

2. EXAMINATION OF NERVES

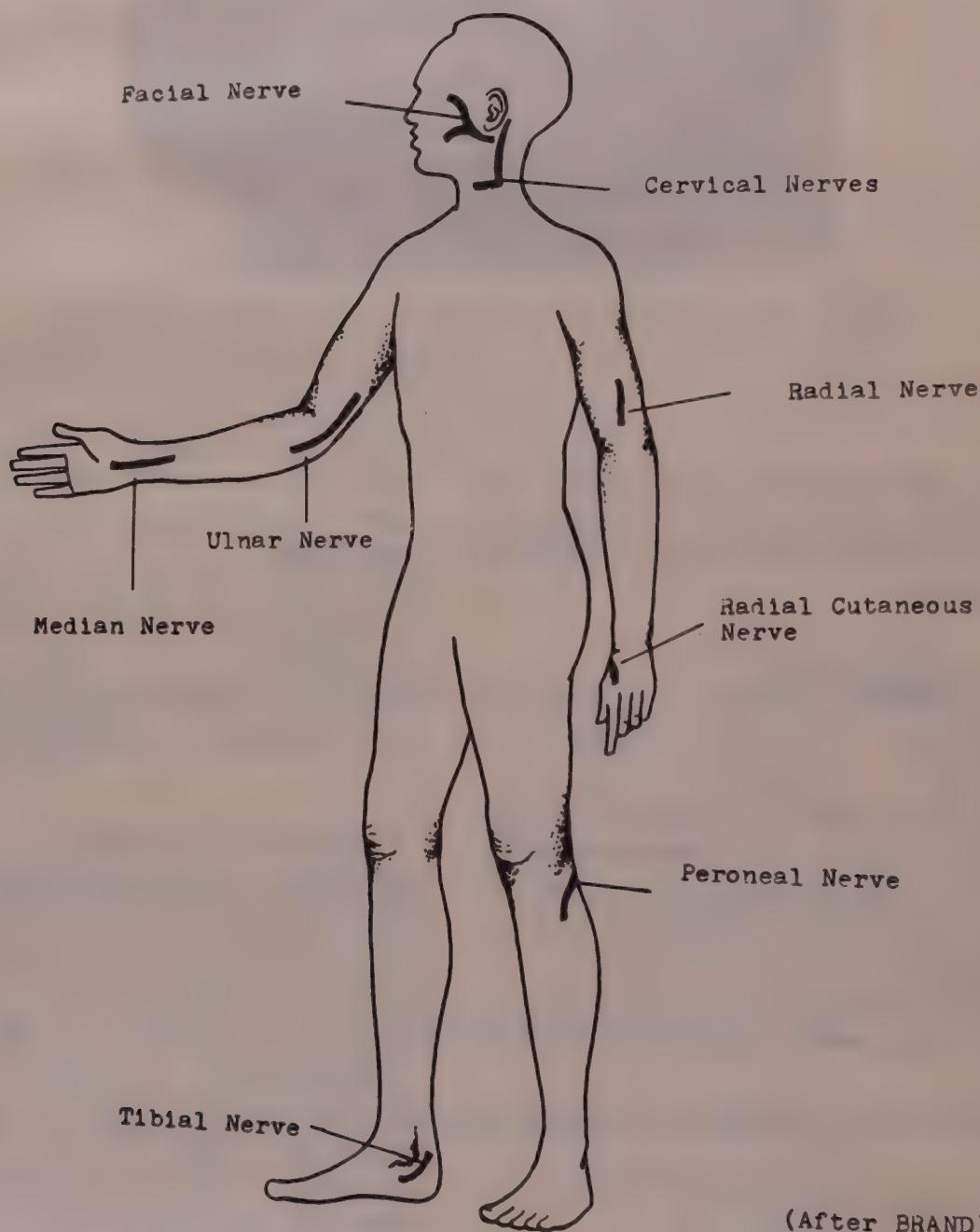
Size, Shape, Texture and Tenderness. The places where enlarged nerves can be felt are illustrated in Fig. 2.3. The nerves themselves of course are continuous from the spine to the hands, feet and head.

Feel gently for these nerves in every patient you examine who might have leprosy. Use the pulp of your finger, not your nails (Fig. 2.4). It is possible to recognise (1) whether the nerve is larger than normal size, (2) whether it is round or oval in shape, (3) whether it is hard or soft in texture, (4) whether any swelling is regular (smooth), or whether the swelling has lumps or "knots" in it, and (5) whether it is unusually tender. Make a record of what you feel. Always look at the patient's face as you feel his nerves.

You will know by his expression if you are causing him pain. From practice on normal nerves on non-leprosy people, you will know what degree of pressure should be painless. Do not cause the

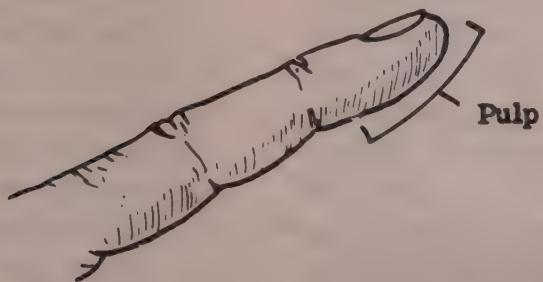
patient unnecessary pain. Feel for any enlarged nerves at all points shown in Fig. 2.3, two on head and neck, three on each arm and two on each leg. Make a record of any nerve tenderness.

Figure 2.3 DIAGRAM TO SHOW PLACES WHERE NERVE DAMAGE CAN BE FELT



Method: Hold the patient's hand gently in your own hand and examine the hand systematically. First look at the front of the hand beginning at the wrist. Then work toward the tip of the thumb and the tips of the fingers. Then turn the hand over and examine the back of the hand, again beginning from the wrist and working toward the tip of the thumb and towards the tip of each finger in turn. You will get a lot of information by **feeling** the hand as well as looking at it. You may find some, or all, of the following signs.

Figure 2.4 Feeling for Nerves with Finger Pulp



3. EXAMINATION OF HANDS

Purposes. (1) Examination of hands and feet can often help you to make a diagnosis of leprosy and (2) classify the case. But it also helps you in (3) to care for a leprosy patient, by helping you to detect heat ("hot spots"). "Hot spots" are one of the earliest signs of hidden infection, which later leads to so many deformities.

Method. Hold the patient's hand gently in your own hand and examine the hand systematically. First look at the front of the hand beginning at the wrist. Then work toward the tip of the thumb and the tips of the fingers. Then turn the hand over and examine the back of the hand, again beginning from the wrist and working toward the tip of the thumb and towards the tip of each finger in turn. You will get a lot of information by feeling the hand as well as looking at it. You may find some, or all, of the following signs.

A. Primary Damage—damage caused directly by *M leprae*.

Dryness: Palms of the hands are normally moist. When *M. leprae* have damaged the autonomic nerve fibres to the sweat glands of the hand, the skin becomes dry. Feel to find out.

Infiltration: In leprosy patients, infiltration of the skin of the hands may result in thickening of the skin and the presence of nodules. It may also result in loss of elasticity of the skin so that the hands look "too old" for the patient. Not only skin, which you can see, may be infiltrated, but also joints, which

you cannot see. You may notice that the fingers are spindle-shaped (narrowed at the tips) because of this.

Muscle Wasting: Muscles which are not used because of motor nerve damage shrink quite quickly. This is called wasting. Compare your hands with the patient's hands. If he has muscle wasting you will easily see the difference. Look particularly on the front of the hand at the base of the thumb (thenar eminence), and at the base of the little finger (hypothenar eminence). On the back of the hand look between the thumb and the base of the first finger (first interbone space).

Muscle Weakness: If the patient does not yet have the kind of severe deformity shown in Fig. 1.4 of Section 1 and Fig. 2.5, test for early muscle weakness in the following way:

- (1) Ask the patient to separate his 4th and 5th fingers from each other and from the other fingers, keeping them straight. Test the strength with which he does this by holding his fingers together.
- (2) Then ask him to hold a piece of paper or a tongue depressor between the 4th and 5th fingers with the fingers straight. You hold the other end of the paper or tongue depressor also between your 4th and 5th fingers and pull until the paper is either in your hand or his. If the patient has markedly weaker 4th and 5th fingers than you, he probably has ulnar nerve damage. (See Fig. 2.3.) Ask him to straighten his thumb and bring it across the palm to touch his 5th finger. If he cannot do this, he has median nerve damage.

Loss of Feeling. Testing for loss of feeling on hands and feet may be very difficult. Some patients with thick skin on their hands, because of hard work, may have quite normal hand sensitivity but be unable to feel light touch with cotton wool simply because of their thick skin. Slight loss of feeling is not important. What is important is loss of feeling which is so great that the hand is not protected against injury. However, since the skin on the hand may be thick, use an object with a fairly sharp point such as a pencil. Press it gently on the skin with increasing strength until the patient can feel the point. Do this at various places over the entire surface of the hand including finger tips. If the patient misses any spots you touch by 2 cms or more, that part of the hand has sufficient sensory loss for it to be at risk of injury. If you wish to test lesser degrees of sensory loss, use a $\frac{3}{4}$ " long end of No. 5 nylon suture material tied to the end of a stick. Compare one hand with the other. Remember that dryness, muscle weakness or wasting, and sensory loss, as described above, are the direct result of *M. leprae* damage and are called **primary damage**.

B. Secondary Damage—damage which may follow the primary damage unless you help the patient to prevent it.

Cracked Skin: Dry skin frequently becomes cracked. Bacteria easily enter the cracks and then get into the skin. This leads to infection. Where there is sensory loss, the infection is painless and may become very severe before it is noticed. When there is loss of feeling, patients may injure themselves in many ways.

Wounds: May be **open** (on the surface) or **closed** (no opening on the surface).

Closed Wounds: Closed wounds are the result of deep injury including bruising and tearing of tissue, following misuse of the limb. The first and most important sign of a closed wound in an insensitive hand or foot is heat. Hot spots may be present before there is any other sign of damage and, all too often, they are overlooked by the examiner. Feel for hot spots with the back of your own hand. Then look for signs of swelling, for blisters, for small discoloured areas where blood has escaped into the skin. If a closed wound is noticed and is not treated properly, it will become an open wound.

Open Wounds: Open Wounds are (1) the result of **neglect**—neglect of an area where skin has been rubbed off, neglect of burns, neglect of deep closed wounds. They are also (2) the result of **penetration** of the skin by a sharp object, for example, a thorn or a nail.

Repeated wounds and the resulting infection causes loss of tissue. Sometimes this is very obvious, for example when fingers have become shortened. But also look carefully for old scars, especially at the tips of the fingers where the soft pulp may be completely replaced by scar tissue. It is important for you to notice this.

Contractures: Contractures occur when joints and the overlying skin are not moved through their full range of movements by the normal activities of the patient (see Fig. 2.5). The contracted skin is rigid, and may be torn easily, thus leading to a crack and possible infection.

Figure 2.5 Contracture



These fingers cannot be pulled straight. Do not try, because there is not enough skin on the inner surface. The skin has contracted because of disuse.

Summary

This examination of hands will help you to point out to a patient the danger to an insensitive hand, and suggest ways for you to teach him how to care for it. It is far easier to prevent deformity from developing or increasing than it is to correct it. Special exercises and methods of skin care are described in Section 6, and in "A GUIDE TO HEALTH EDUCATION IN LEPROSY". Examination of hands will also help you to diagnose and classify leprosy patients. This will be explained in Section 3.

4. EXAMINATION OF FEET

Purpose. As with the hands, examination should (1) help you make a diagnosis of leprosy, (2) classify the case and (3) help you detect early the hot spots and other signs of infection and danger.

A. Primary Damage. (1) Sensory loss, (2) dryness, (3) infiltration, (4) muscle weakness and (5) wasting occur in the feet, as in the hand, and are even more important because the patient must walk on his insensitive feet. But he cannot see the sole of his foot easily. He may be completely unaware of what is happening to it. Test for sensory loss in the same way as on the hand, over the heel and the entire sole, including all five toes, and also along the lateral (outer) side of the foot. Feel for dryness as you did for the hand. Muscle wasting and weakness in the foot are not easy to observe, except the weakness of foot drop (see Fig. 1.6).

B. Secondary Damage. (Contractures, cracked skin, wounds and loss of tissue.)

Cracked Skin: This is common around the heel especially at the beginning and end of the wet season.

Wounds: As in the hand, wounds in insensitive feet may be open or closed. Feet with loss of feeling are much more likely to get both open and closed wounds than are normal feet. If a patient with loss of feeling in his feet walks a long distance, he will get blisters just as a normal individual does. Similarly, if he has nails in his shoes, walks on thorns or broken glass, or burns his feet with hot water or on a hot coal, he will suffer wounds just as a normal individual does. But he may not recognise that he has a wound, at least not until the wound is quite severe. For example, some patients sitting round a fire at night have accidentally put their feet in the fire and not realised they were burning until there was a smell of burning flesh.

Wounds from Walking: In addition to wounds caused in the above ways, patients with muscle paralysis, such as foot drop (see Fig. 1.6), injure their feet during walking.

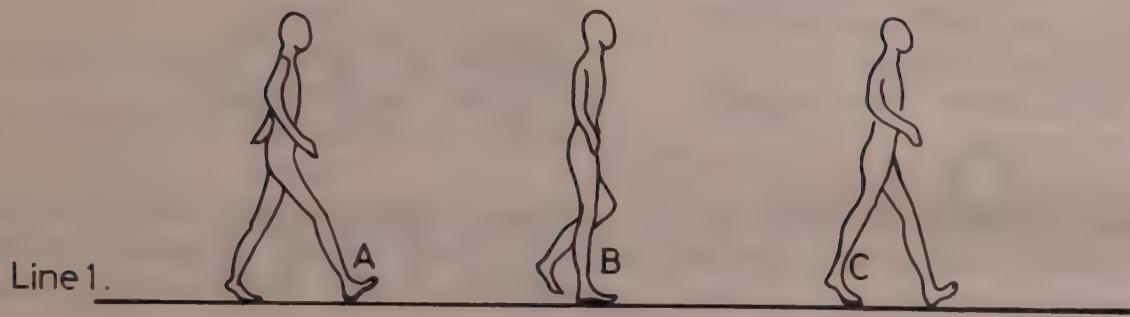
This is especially true if the patient has lost feeling on the soles of his feet. He does not feel the first signs of fatigue, of tenderness, and of developing wounds. Wounds from walking are deep, closed wounds, hidden inside the foot. Tissues inside the foot are damaged because body weight falls on unusual parts of the feet.

Look at Fig. 2.6. Lines 1 and 2 show a person with normal feet walking. Line 1 shows his heel coming down on the ground first (Point A). Then his whole foot takes his whole body weight (Point B). When he pushes off the ground at the end of the step, his body weight shifts forward to the front of the foot and the five toes (Point C). Line 2 shows the parts of the sole of the foot which are receiving most of the body weight. First the heel (Point A), then the whole foot, (Point B), and finally the front of the foot and all the toes (Point C).

Lines 3 and 4 show the way a leprosy patient with foot drop walks. Line 1 shows that his toes and the front of his foot, instead of the heel, come down first (Point A). Then the outside of his heel and sole receive his body weight (Point B). Finally at the end of each step he pushes off from the outer and little toe side (Point C). The dark parts of the sole of the foot in Line 4 show where deep, hidden, closed wounds start to develop. Later these closed wounds break out to the surface of the foot. Then they are recognised, and are called plantar ulcers, because they are on the bottom (plantar) of the foot.

Recognition of Wounds. Open wounds on the feet are easy to see if the patient learns to examine his feet every day. Deep inner wounds will not be noticed unless you or the patient FEEL for hot spots and look for other signs of them. These other signs include tenderness, swelling, redness of the swelling, spreading of the toes, redness of the skin and blisters. Effective health education should prevent most wounds. This could avoid the necessity for treatment. See "A GUIDE TO HEALTH EDUCATION IN LEPROSY".

Normal Walking



Patient Walking

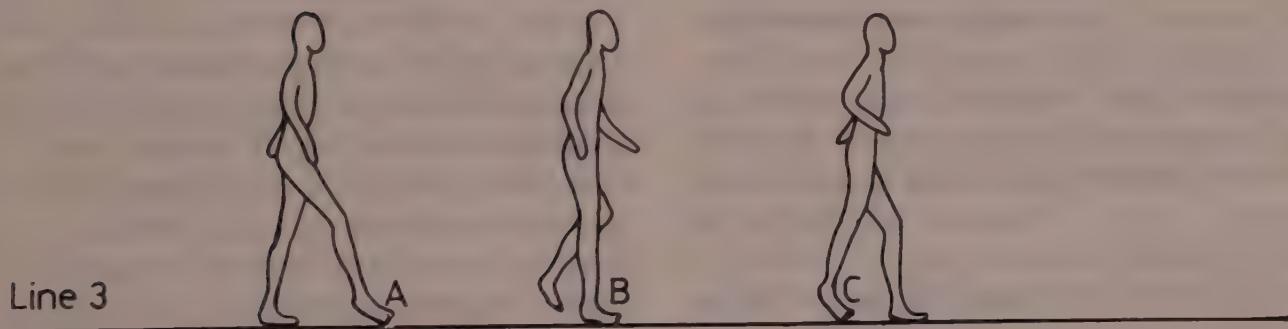


Fig. 2.6 Wounds from walking.

5. EXAMINATION OF EYES AND EYELIDS

Purposes. As with the examination of hands and feet, examination of eyes may help in (1) diagnosis, and also (2) in care of the patient, including early detection of eye difficulties, and early treatment so as to prevent blindness.

Begin by asking the patient if he has pain in the eye or difficulty in seeing.

Pain: Normal eyes are, as we all know, very sensitive indeed. Some leprosy patients can feel pain in their eyes and will complain of pain. Others are losing, or have completely lost, sensation. When their feeling of pain is reduced, they may have quite severe damage to their eye or have foreign bodies under the eyelids without realising it. Test for loss of feeling in the eye with a wisp of soft, clean cotton wool; never with anything stiff. It is especially important to make sure that no eyelashes are rubbing on the cornea and that the patient who has lost feeling can and does close his eyes often enough to keep the cornea moist. A patient who has lost sensation to pain will often complain of itching when there is a disease in the eyes.

Vision: Patients do not always realise that their vision is getting worse, especially if this is happening slowly. Use the simple test described here to check vision. Cut out one of the small black "C's" printed and attach it on a round card about 3 inches in diameter (see Fig. 2.7). A person with normal eyes can see the opening in the C at a distance of about 6 metres, or 18½ ft. Always hold the card in a good light. Start at 6 metres from the patient and test first one eye and then the other. Start by asking him to cover his left eye. Then ask him to point with his arm to the way out of the circle. Turn the circle several times in different directions and repeat your question. If he cannot recognise the opening or even see the circle, take a step approximately one metre long (39 inches) towards him. If necessary, repeat your steps toward him until he can see the opening. Record the distance at which he sees the opening. Repeat with the right eye.

Make a record of the distances at which he can locate the opening correctly several times. The following simple records is satisfactory:

Patient can see opening with Both eyes at metres.

Patient can see opening with Right eye only at metres.

Patient can see opening with Left eye only at metres.

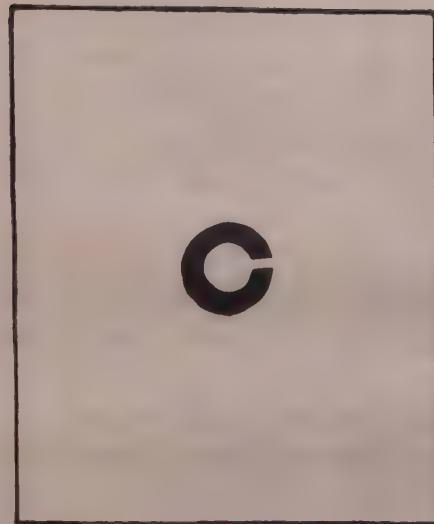
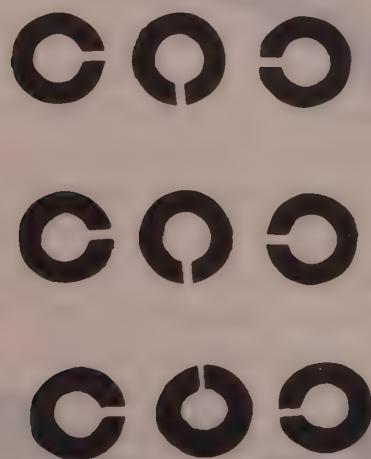
You can check his vision when you see him again in a few months, or sooner if he has eye complications, and so know if his vision is changing.

Appearance: Having questioned the patient about pain and checked his vision, then look at each eye. Begin with the eyelids, then eyelashes, then conjunctiva, then sclera, iris and pupil. If you do not follow a system like this you will overlook important signs (see Fig. 2.8).

Eyelids: Normal eyelids lie against the eyeball and push tears over the curve of the eyeball during blinking. Eyelids in leprosy patients may be normal, or they may be infiltrated, or even clearly swollen. Most important of all, the patient may not be able to close his lids (lagophthalmos). This is due to paralysis following motor nerve damage. The lower eyelid may hang out away from the eyeball. Then it does not hold tears in. (See Section 6, Fig. 6.10.) Closing the lids often is important because (1) it protects the eyeball from injury and from drying out, and (2) it ensures that tears are spread evenly over the conjunctiva (lining of the eyelids and covering of the front of the eyeball). This keeps the eyeball moist and washes away any small particles which blow onto the eyeball.

When a patient cannot close his eyes properly the cornea may become damaged both by (1) injury and by (2) drying out. Exposed conjunctiva also becomes damaged and will appear red. The damaged cornea becomes scarred and looks cloudy (exposure keratitis). Some patients who cannot close their eyes can be helped by exercises (see Section 6, "Eye Exercises"). Some will need surgery.

Figure 2.7 Testing Vision



Eyelashes: Eyelashes normally curve outwards. Sometimes when eyelids are swollen the eyelashes turn inwards and scratch the surface of the eyeball. If the eyeball is insensitive, infection may occur without the patient feeling pain. In patients who have trachoma as well as leprosy, the eyelashes may be turned in because of the trachoma rather than the leprosy.

Conjunctiva: Redness or pus on the conjunctiva (the white of the eye and eyelid lining) means danger. If the redness is all over the conjunctiva and is not accompanied by loss of vision or severe pain, the patient has conjunctivitis. If the redness is seen only, or mainly around the cornea, if the eye is painful, and if there is loss of vision, the patient probably has uveitis. It is important to know the difference between conjunctivitis and uveitis because the treatment is different. Treatment is given in Section 6.

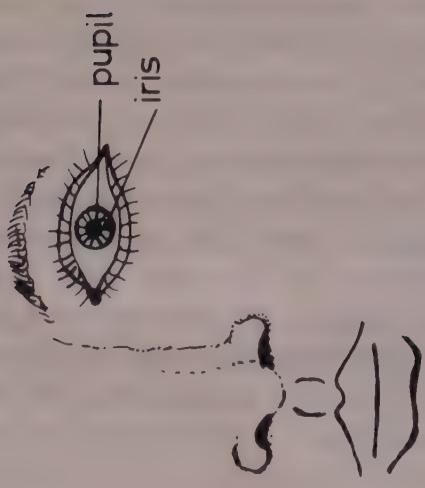
Cornea: As mentioned above, the cornea may appear cloudy because of exposure which results when eyelids do not close. *M. leprae* itself can cause this sort of cloudy appearance but it will be mainly in the upper third of the cornea. The cloudiness due to exposure is in the lower third. Where there is pain and redness of the conjunctiva, always look for a corneal ulcer, that is, a

wound on the cornea. To do this you really need fluorescein. If you are not sure if there is any wound you must send the patient to your supervisor or to hospital. You may also observe that the cornea is cloudy all over, and the patient complains of severe pain (or itching in eyes that have lost sensation) and loss of vision. These changes are due to glaucoma and the patient requires urgent hospital care.

Iris: The normal iris has a beautiful regular and perfectly round pattern. If this pattern is replaced by patches of dark discolouration, this is a sign of long-standing damage.

Pupil: The pupil is the black centre. It is normally (1) round, (2) approximately the same size in both eyes, (3) has a regular edge. (4) The size changes, getting smaller as the person looks into bright light and larger in the dark. Loss of any of these four normal features means the eye is seriously damaged. Very small pupils occur when the iris is stuck to the lens. Very large pupils sometimes occur in glaucoma or may be due to use of atropine. Any abnormal changes in the size of the pupil should be recorded and reported to your supervisor. Treatment of the eye is described in Section 6.

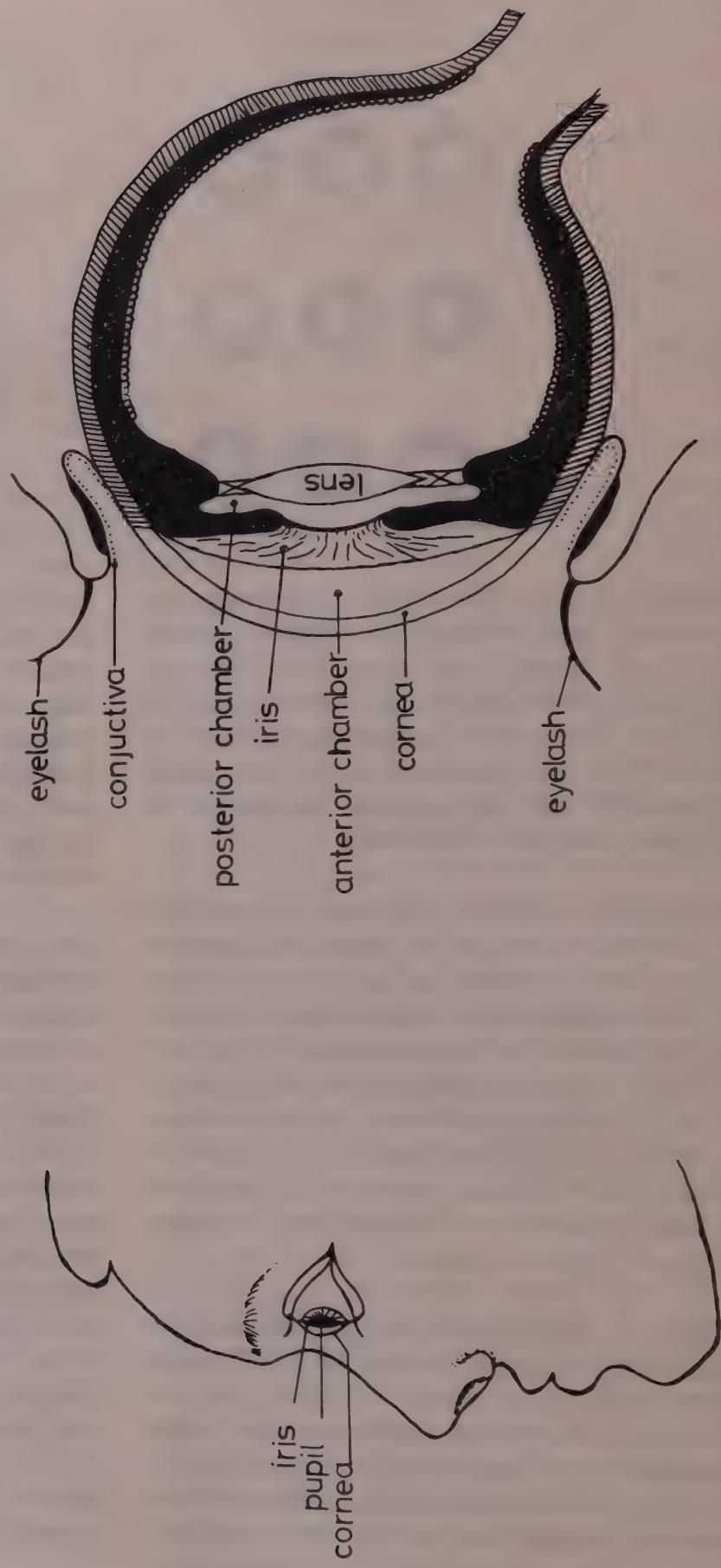
Figure 2.8 THE EYE



Upper Left: The pupil (black spot in the centre of the eye) is a hole. It lets light into the eyeball so we can see. The iris (striped circle around the pupil) has muscles. These muscles can make the pupil larger in the dark, and smaller in bright light.

Lower Left: The cornea is a transparent covering which protects the iris and the pupil from dirt and infection.

Lower Right: Light must be able to pass through all of the following: cornea, fluid in the anterior chamber, pupil, fluid in the posterior chamber, and the lens. Only then can light get to the back of the eyeball so a person can see. The conjunctiva is the lining of the eyelids and continues to cover the outer edges of the eyeball beyond the cornea.



6. EXAMINATION OF OTHER ORGANS

(Nose, Mouth, Throat, Breasts, Testes)

Nose: Leprosy patients often complain of difficulty in breathing through the nose. Sometimes they complain of nose bleeds. These problems occur because of *M. leprae* found in very large numbers in the lining of the nose in certain cases. Up to one thousand million may be discharged from the nose of one of these patients in a single day. These nasal discharges are a source of the *M. leprae* which spread leprosy.

Begin your examination by looking at the outside of the nose. Look for **nodules**, especially at the edges of the nostrils, for **infiltration** and for **changes in shape** (see Fig. 2.9). Then look inside the nose. To do this properly, a nasal speculum is desirable. Much can be seen without a speculum. Inside the nose look for **nodules**, for **infiltrates** and for **ulceration**. In advanced cases you may find **perforation** of the nasal septum (a hole in the septum or wall between the two sides of the nose).

Mouth: The lining of the mouth is affected in the same way as the nose in certain cases. Look at the tongue, gums, hard palate and soft palate for **infiltration** and **nodules**.

Throat: It is not possible to examine the throat and voice box without special instruments. Leave these to the doctor. You can get a good idea, however, about the throat by listening to the patient talk and by getting him to take a deep breath quickly. A **hoarse voice** and a **whistling sound** on deep breathing will tell you that the voice box is seriously affected.

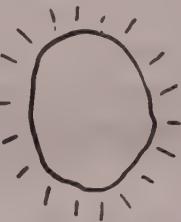
Breasts: Some male patients have swelling of one or both breasts. This is called **gynaecomastia**. Patients may be too embarrassed to mention it. Always look at male patients' breasts and feel enlarged breasts to see whether the enlargement is just due to fat or to increased breast tissue. Breast tissue is firm and dome shaped. Fat is soft and has no particular shape.

Testes: Patients do not like having their private parts (genitalia) examined. Do not expose them unnecessarily but do examine private parts in male patients. Look for **infiltrates**, **nodules**, **patches**. Feel the testes. Usually they are normal. They may be **smaller** and **softer** than normal. In leprosy patients, small, soft testes are usually the result of severe damage by *M. leprae*.

Figure 2.9 COLLAPSED NOSE. The lining of the nose shrinks inward pulling the end of the nose upward. The upper lip will then seem unusually long.



Figure 2.10 CHECK LIST FOR CLINICAL EXAMINATION

		Ask the patient	Look for:
	SKIN	What has he seen?	Patches Infiltration Signs of Reaction (Section 3) Dermatitis (Section 5)
	NERVES	Pain?	Tenderness Enlargement
	HANDS	Loss of feeling? Pain?	Dryness Weakness Injuries
	FEET – SHOES	Loss of feeling? Pain?	Dryness Weakness Injuries Deformity Shoes, and their state of repair
	EYES	Loss of vision? Pain?	Redness (where?) Pupil and iris Eyelashes

NEVER GIVE DDS TO A PATIENT WITHOUT FIRST EXAMINING HIS:

SKIN – NERVES – HANDS – FEET AND SHOES – EYES!

Be sure that the patient really has leprosy. If you are not sure, it will not hurt the patient if you do not start his treatment for another week or two until someone with more experience can make the correct diagnosis. Otherwise you may cause the person great social and personal distress by calling him a leprosy patient when he may not have leprosy at all.

RECORDING EXAMINATION FINDINGS

Many different forms may be used to record examination findings. Each has its advantages and disadvantages. But some kind of record **MUST** be kept, otherwise it is impossible to justify treatment, or to judge whether patients are improving or getting worse.

The forms on the following pages (Figs 2.11 and 2.12) are designed to encourage the examiner while he is examining the patient, to answer for himself the questions below. Whatever form you use, be sure you try to answer these questions:

1. Is it leprosy?
2. If it is leprosy, what classification (kind, type) of leprosy is it? (See Section 3.)
3. Is the case probably infectious? (Lepromatous or borderline?)
4. What damage has the patient suffered? (What is his deformity grade?) (See Fig. 2.12.)
5. Is the case active? (See definition of "activity" in Section 3 under Tuberculoid Leprosy.)
6. Is the patient getting worse or relapsing? (See Section 4.)
7. Does the patient show signs of reactions? (See Section 4.)
8. How long will this patient probably need treatment? (See Section 3.) (Of course,

this answer may need revision at a later date.)

9. How likely is this patient to have reactions? (See Sections 3 and 4.)

Full Clinical and Management Records

Every full clinical record form should include the following information:

1. Identification information: name, clinic number, address including directions for reaching his home.
2. Dates of first examination and every additional examination.
3. Diagnosis, classification, and degree of deformity, including enough evidence or information to justify your diagnosis, classification and deformity grade.
4. Record whether the case is active or inactive, including enough evidence or information to justify the decision.
5. Treatment ordered: drug, dosage, including frequency of dosage.
6. Attendance: frequency and regularity of attending clinic and amount of the prescribed drug actually taken.

Where leprosy programmes are already in operation, workers will be expected to use the forms provided.

Figure 2.11
(Sample examination record form --- page 1)

Patient's Number	Sex	Day	Mo.	Year	Diagnosis												
Birth place					Classification												
Present residence					Disposal												
Name					Year of Birth												
DIAGNOSIS, CLASSIFICATION AND ACTIVITY																	
1. Greet the patient politely and put him at his ease.					<table border="1"> <tr><td>A patch or patches</td><td>Yes</td><td>No</td></tr> <tr><td>Numbness or painless</td><td></td><td></td></tr> <tr><td>Wound</td><td></td><td></td></tr> <tr><td>Weakness or paralysis</td><td></td><td></td></tr> </table>	A patch or patches	Yes	No	Numbness or painless			Wound			Weakness or paralysis		
A patch or patches	Yes	No															
Numbness or painless																	
Wound																	
Weakness or paralysis																	
2. Ask "What is your problem?" It is probably																	
Other?																	
3. Ask YOURSELF: "Is it leprosy?"																	
Examine → If 1 is YES, this is leprosy. If 2 or 4 is YES, it is probably leprosy. If 2 and 4 are YES, it is almost certainly leprosy. If 3 is YES, almost certainly it is leprosy.					←												
1. Lack of response to cotton wool in patches 2. Enlarged nerve or nerves 3. Positive skin smears 4. Areas of skin infiltration with nodules					<table border="1"> <tr><td>Yes</td><td>No</td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> </table>	Yes	No										
Yes	No																
4. If it IS leprosy, what KIND is it? (7 tests) Place an "X" along each of the diagrams as appropriate.																	
1. How many patches?					Few Many Uncountable												
2. How are patches arranged on the body?					Asymmetrical Partly Symmetrical Absolutely Symmetrical												
3. How well defined are the edges of skin lesions?					Very Well Fairly Well Not at all												
4. What proportion of normal skin colour is lost?					75% 50% Less than 50% None												
5. What loss of sensation in response to cotton wool test in patches?					Marked loss Some loss No loss												
6. Are other organs besides skin and nerves involved?					NO YES — Nose — Mouth — Voice — Breasts — Testes												
7. Are skin smears positive?					0 Less than 1 1 2 3 4 5 6												

Figure 2.11 (continued)

(Sample examination record form — page 2)

5. EXAMINE OTHER ORGANS. CAREFULLY, if you found them involved in your examination in 4. 7 above		YES	NO	DESCRIPTION (IF YES)
	Eyes			
	Nose			
	Mouth			
	Throat			
	Voice			
	Testes			
	Breasts			
	Other disease			
Look for signs of any disease other than leprosy: _____				

6. NERVE INVOLVEMENT	Cervical	Facial	Radial	Ulnar	Median	Rad. Cut.	Peroneal	Tibial
Nerve enlargement								
Nerve tenderness								
Muscle paralysis								

7. DAMAGE TO HANDS, FEET, EYES.

(Use numbers as follows:)

1 = Sensory loss

2 = Wounds, correctable deformity

3 = Very severe damage, deformity not correctable

Damage:	YES		NO
	RIGHT	LEFT	
Hands			
Feet			
Eyes			

8. IS THE LEPROSY ACTIVE? 1/

YES NO

YES NO

Signs of leprosy can be seen		Lesions are red	
Signs of leprosy are increasing		Lesions are wrinkled	
Signs of leprosy are decreasing		Lesions are raised	

IS THE CASE ACTIVE?	YES	NO
---------------------	-----	----

9. IS THE PATIENT GETTING WORSE?

a. REACTION? 2/

YES NO

YES NO

YES NO

Patches raised

Nodules recent

Patches red

Nodules tender

Patches scaly

Nodules ulcerated

Recent weakness

Oedema: face hands, feet

IS THE CASE IN REACTION?

YES NO

b. RELAPSE?

YES NO

YES NO

YES NO

Nodules recent

IS THE CASE RELAPSING?

Nodules increasing

Nodules tender

Patches increasing in size

10. From these examination findings, how long do you estimate that the patient will need to take drug treatments?

Years

11. What are the chances that this patient will have reaction in the next 6-12 months?

Very little _____; Somewhat likely _____; Very possible _____

1/ See signs of activity in Section 3 under Tuberculoid Leprosy

2/ See Section 5

RECORDING DISABILITY AND DEFORMITY

One value of using the World Health Organization Disability and Deformity Grading Form in the leprosy control programme is to indicate whether

or not newer patients being registered have little deformity. If so, your case finding efforts are good. If they have much deformity, it indicates that earlier case finding is needed (Fig. 2.12).

Figure 2.12 WORLD HEALTH ORGANIZATION – DISABILITY RECORD (WHO/LEP/09.1,p.5)

Patient's name _____	Examiner _____									
No: _____	Date _____									
GRADE	HANDS		FEET		EYES		OTHER			
	Sign	L	R	Sign	L	R	Sign	L	R	Involvement of Larynx
Grade 1	Insensitivity			Insensitivity			Conjunctivitis			Yes No
Grade 2	Ulcers and injuries			Trophic ulcer			Lagophthalmos			Collapse of nose
	Mobile Claw hand			Clawed toes			Iritis or Keratitis			
	Slight absorption			Footdrop			Blurring vision			
Grade 3	Wrist drop			Contracture			Severe loss of vision			Facial paralysis
	Joint stiff									
	Severe absorption				Severe absorption			Blindness		
Minimum Grade										Yes No

In the section on hands, feet, eyes, each square should be marked with an "X" if the disability is present, or left blank if it is absent. At the bottom of each column, the maximum grade number (1, 2 or 3) should be noted, recording the most severe disability of that limb or eye.

In the last section, larynx, nose and facial paralysis, there is no grading, only an "X" for the presence or absence of the disability.

In the case of the hand, it may seem strange to grade a hand "3" if only one finger is absorbed. However, in this simplified system only a qualitative estimation is possible. For those who wish to collect more precise information, the same form may be used, with the addition of more vertical columns to sub-divide, for example, each hand into ulnar and median parts, or further sub-division into digits.

DIAGNOSIS, CLASSIFICATION AND MANAGEMENT

When you have taken a history and examined any patient and made your records in the way just described, you are ready to proceed to:

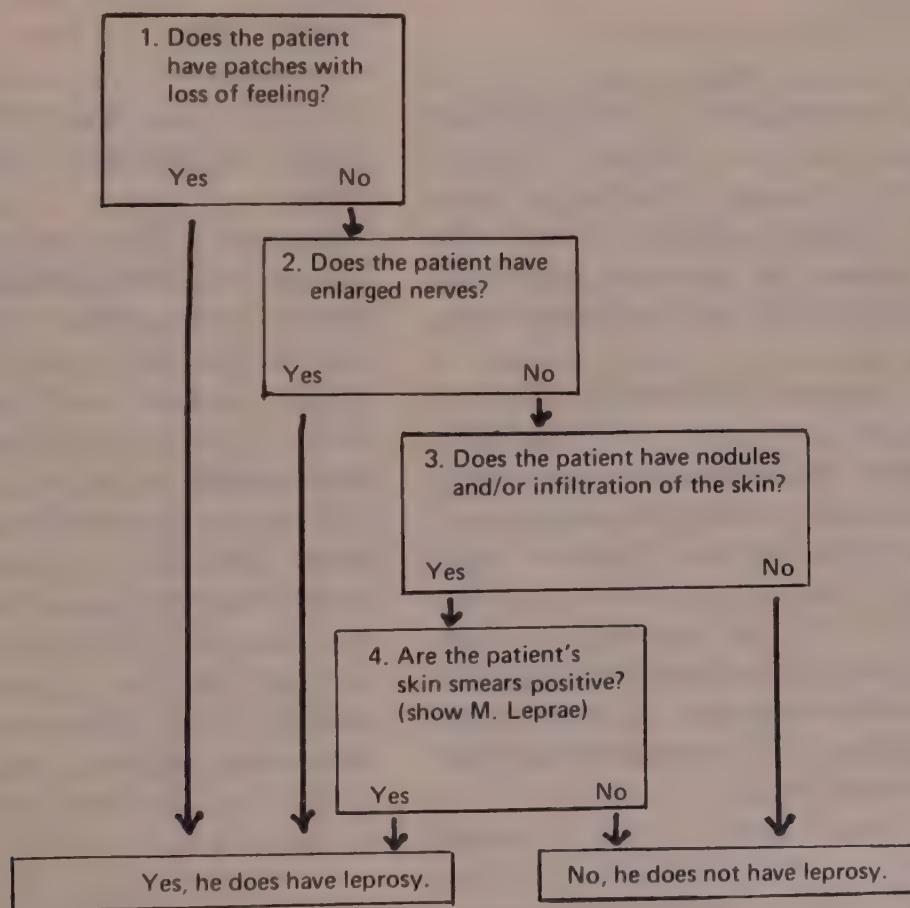
1. Make a diagnosis. This depends on your having found at least one of the four cardinal signs of leprosy, shown in Fig. 2.13:
 - a) loss of feeling
 - b) enlarged nerves
 - c) nodules or infiltrated skin
 - d) positive skin smears.

2. Classify the case, see Section 3.

3. Grade the patient according to his degree of deformity. See World Health Organization chart, Fig. 2.12.
4. Recognise and treat reactions, see Section 4.
5. Prescribe treatment for leprosy patients, see Section 5.
6. Manage complications other than reactions, see Section 6.

Figure 2.13 QUICK LEPROSY DIAGNOSIS FORM

Ask yourself as many of the four questions below as necessary to reach a final decision on whether the person has leprosy or not. Circle each correct "yes" or "no", and your final "yes" or "no" decision.



If you are in doubt about the answer to any one of the questions above, refer the person to your supervisor.

Section 3 DESCRIPTION AND CLASSIFICATION OF DIFFERENT KINDS OF LEPROSY

It is important to remember that all kinds of leprosy are caused by only one kind of bacillus: **MYCOBACTERIUM LEPRAE** (*M. leprae*). In every case of leprosy some of these bacilli are present somewhere in the body. If there are no leprosy bacilli, the person does not have leprosy. This is important to remember, because some of the terms used to describe different kinds of leprosy may cause confusion unless it is clearly understood that all kinds of leprosy are caused by the same kind of bacilli (*M. leprae*).

Remember:

**NO M. LEPRAE —NO LEPROSY CASES
ALL LEPROSY CASES—SOME M. LEPRAE.**

PATIENT RESISTANCE

DETERMINES THE KIND OF LEPROSY

The different kinds of leprosy are due to different degrees of resistance in the bodies of different people, not to different kinds of bacilli. There are only a very few people whose bodies seem completely unable to resist the attack of *M. leprae*. In these few people *M. leprae* multiply very freely and finally reach very large numbers.

At the other extreme, fortunately, there are very many people who have such complete body resistance to *M. leprae*, that, even when they are exposed to large numbers of *M. leprae* they do not develop leprosy. Probably these people are by far the most common in society, as much as 85% of the total population. In fact, even in families where there are severe cases of leprosy, only about one quarter of the children ever develop the disease. The rest have high resistance. (Look again at Fig. 1.1.)

Many early cases of leprosy have high enough resistance that they heal themselves with no treatment of any kind. Thus, three quarters of those children who do develop leprosy have such strong resistance that they overcome the disease themselves at a very early stage even without

treatment. Between these two extremes of no resistance and very high or complete resistance, there are, of course, very wide differences in resistance, and therefore a wide variety of leprosy cases.

CLASSIFICATION OF CASES INTO GROUPS

AIDS TREATMENT AND CURE

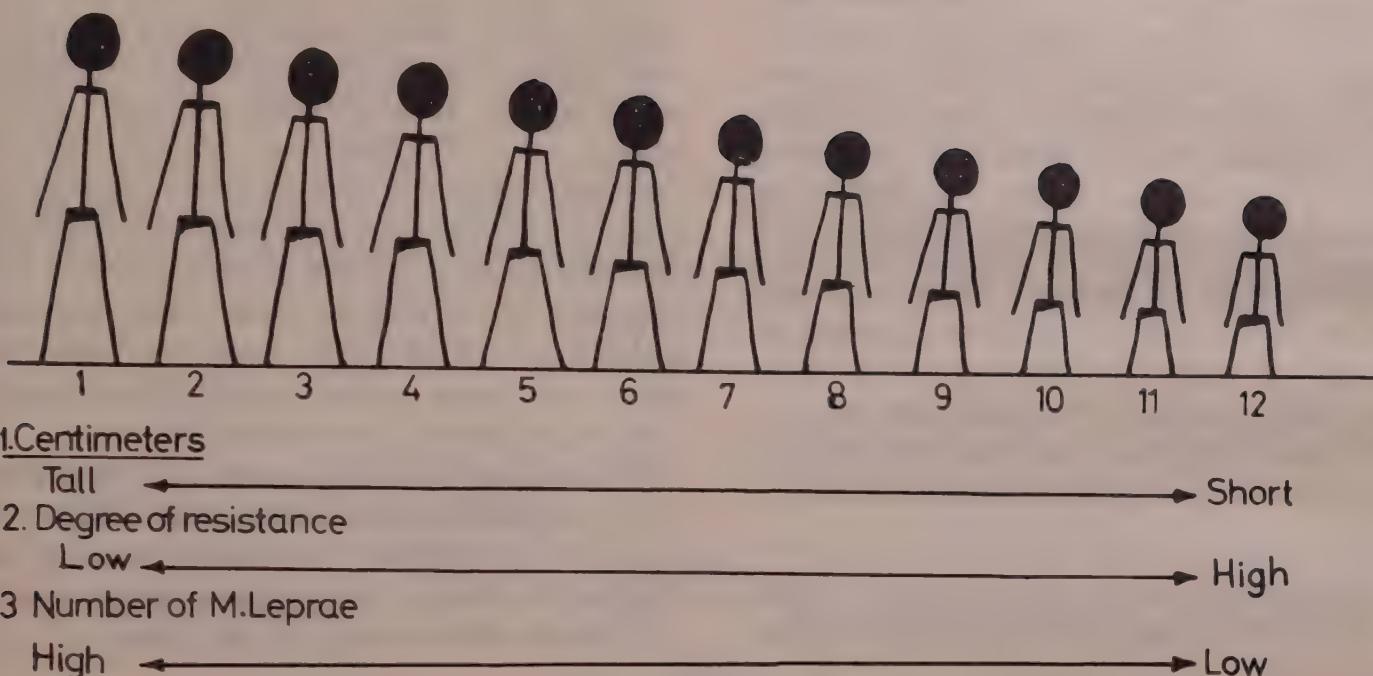
In one sense each case of leprosy is not like any other case, and might be given its own classification. This, of course, would make classification quite useless. In order to help in the treatment of leprosy, it is useful to group patients in such a way that similar cases come into the same group.

The grouping or classification of leprosy cases into the three main groups is similar to the grouping of people into short, medium and tall heights. After we have decided the inches or centimetres we will include in our definition of the short group, the medium group, and the tall group, we just put everyone into his proper group.

Suppose 100 people were all lined up according to height with the tallest at one end and the shortest at the other end. Everyone would agree that the people at one end are tall, those in the middle medium, and those at the other end short. It might be difficult to get everyone to agree exactly where to draw lines between the tall group, the medium group and the short group (see Fig. 3.1 line 1). Of these twelve people everyone would agree that numbers 1 and 2 are tall, that numbers 6 and 7 are medium and that numbers 11 and 12 are shortest. But exactly where shall we put numbers 3, 4 and 5? Where shall we put numbers 8, 9 and 10? Where is the line between tall, medium, and short people? We find it difficult to decide.

In the same way, it is not always easy to decide just exactly where to draw a line between the three main types of leprosy. But it is important to try to decide, if we really want to give the patient the best possible care.

Fig. 3.1 Clasification



TYPES OF LEPROSY

The characteristics of the different kinds of leprosy are not quite so easy to define as is height. But the different kinds of leprosy can be described reasonably well. This description is based on (1) the degree of resistance, and (2) the number of *M. leprae* found in skin smears (see Fig. 3.1, lines 2 and 3). If we are working in rural areas we usually cannot directly measure either the number of *M. leprae* or the exact amount of resistance. But we have learned that we can make quite good guesses about both the number of bacilli and the person's resistance from looking at the signs or symptoms which the patients show, that is, the findings of the examination. These have already been described in Section 2. Fig. 3.1, lines 2 and 3, shows this relationship between number of bacilli and resistance to the three main groups of leprosy cases.

THREE MAIN TYPES (GROUPS) OF LEPROSY (LEPROMATOUS, BORDERLINE, TUBERCULOID)

In Fig. 3.2 these three main types are listed in squares on a diagonal from upper left to lower right: Fig. 3.2 shows in a different way what

Fig. 3.1, lines 2 and 3, showed. No leprosy is also a part of this diagonal. On the bottom line degrees of body resistance are shown: no resistance, moderate resistance, high resistance, and very high, or complete resistance. The middle four lines as seen on the sides of the diagram, show differences in the number of bacilli (*M. leprae*) present in the body, as determined from skin smears: (1) innumerable (so many and so close together that they really cannot be counted), (1) many, (3) few, and (4) none.

Lepromatous Leprosy (abbreviation = L) is shown in Fig. 3.2 to occur in people with no resistance and innumerable *M. leprae* multiplying in the body.

Borderline Leprosy (abbreviation = B) develops in those patients with only moderate amounts of resistance. This moderate resistance can reduce the number of *M. leprae* somewhat, but many will still remain and multiply in the body, as seen in Fig. 3.2. The fact that the body does have moderate resistance keeps *M. leprae* from multiplying to innumerable numbers. It also means that a "fight" is going on between the *M. leprae* and the body's resistance.

Tuberculoid Leprosy (abbreviation = T) occurs in patients with **high resistance** and **few M. leprae**, as shown in Fig. 3.2. The high resistance keeps *M. leprae* from multiplying to larger numbers.

People with **very high** or **complete resistance** have practically no *M. leprae* in the body because their resistance has destroyed them. These people do not develop leprosy. This can be seen in the lower right hand block of Fig. 3.2.

The Spectrum of Leprosy: These three main types of leprosy are part of what is sometimes called the spectrum of leprosy, because these types change gradually from one into the next just the way the colours (spectrum) of a rainbow change gradually from one colour to the next.

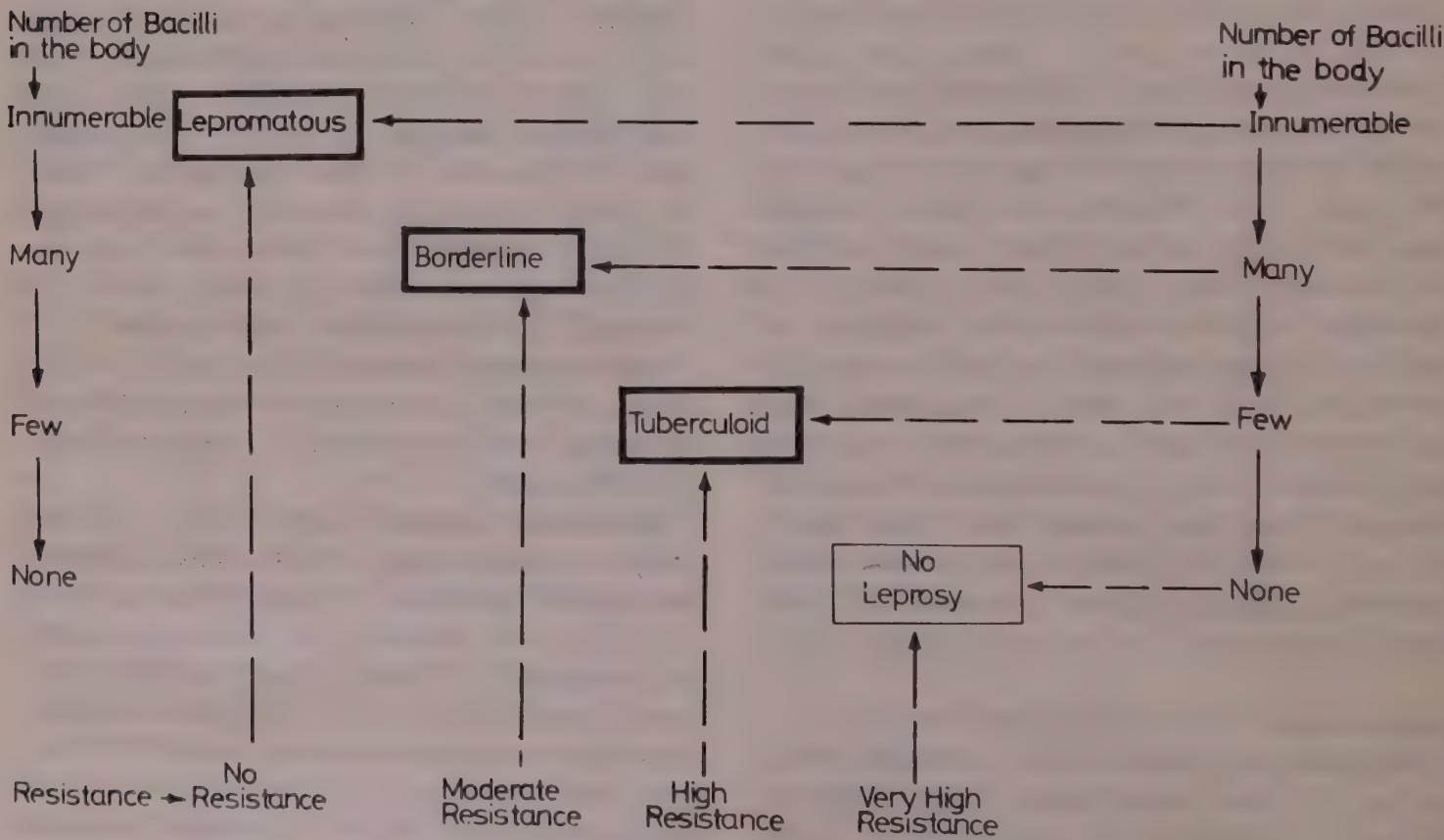
Indeterminate Leprosy (abbreviation = I). No one would be foolish enough to look at a one-year-old child and say definitely whether he was

going to be tall, medium or short when he has grown up. There is a kind of leprosy which, in its **very early stages**, is equally impossible to classify. It is called '**Indeterminate Leprosy**', which means that the type cannot be determined at the present time. (Do not confuse 'indeterminate' with 'intermediate' which means in between!) Indeterminate leprosy may start in a person who has such **very high resistance** that his body soon cures the disease without any treatment. Or in another person with **less resistance**, the 'indeterminate' signs may later become much more marked (more 'determined'). The kind of leprosy is now quite definite.

At a very early stage in leprosy it is impossible to tell whether a patient has lesions which will heal with no treatment (self-healing lesions), or whether his leprosy is likely to progress to one of the more severe kinds.

Fig. 3.2 Patient Resistance Determines the Signs of Leprosy.

Three Main Groups of Leprosy Cases
Lepromatous Borderline Tuberculoid



THE PROGRESS OF LEPROSY (Fig. 3.3)

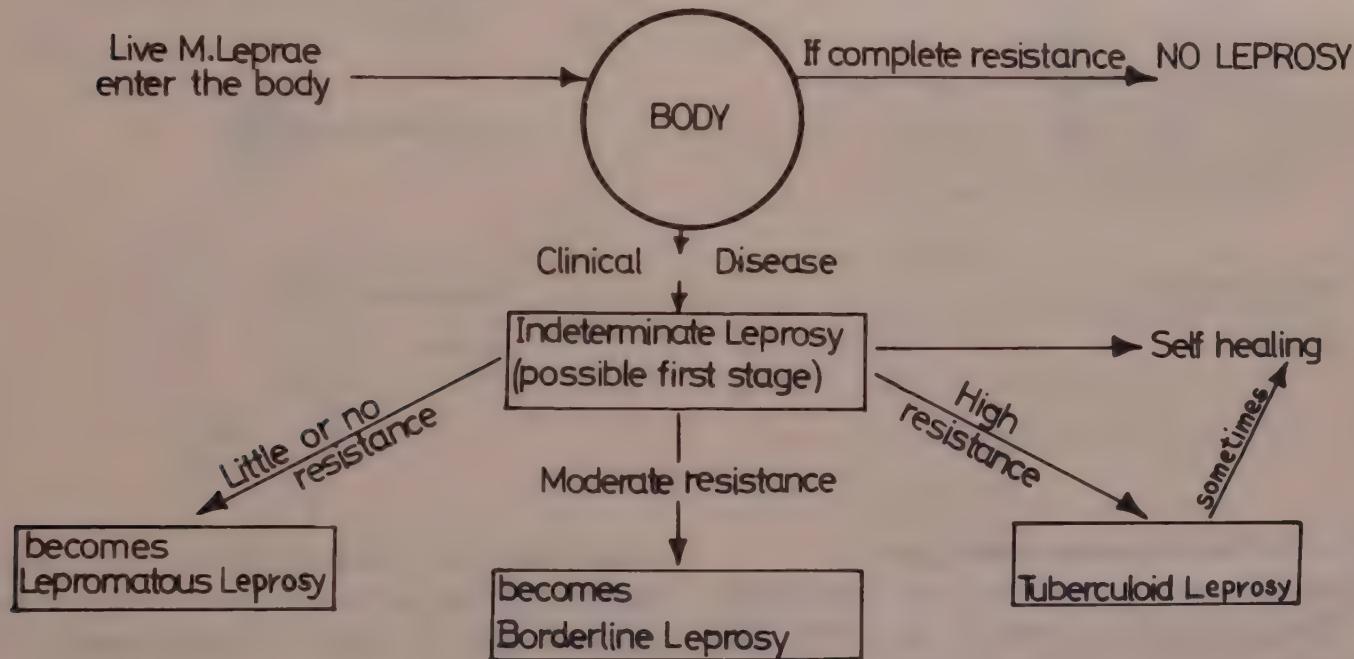
When live *M. leprae* enter the body, the person's resistance determines whether he will get leprosy. If he has very high or complete resistance his body will kill off the *M. leprae* and there will be no leprosy. (Top line of Fig. 3.3). This is probably what happens in most people.

In patients with a little less resistance, some type of leprosy may follow. Early signs of leprosy are often not noticed. But if they are recognised,

son's resistance. While tuberculoid leprosy sometimes heals itself with no treatment, all of these main types should be treated as soon as the diagnosis is certain.

Classification of Cases Aids Treatment of Patients and Control of Leprosy: It is very useful to determine which classification of leprosy each patient has, because (1) some of the problems

Fig. 3.3 Progress of Leprosy



they often fit the description of Indeterminate Leprosy. This type may (1) cure itself with no treatment at all (self-healing), or (2) it may be cured by DDS drug treatment, or (3) it may change and begin to look more like one of the main types of leprosy (Fig. 3.3 bottom line). Which type of leprosy will depend on the per-

of treatment of each group are different, (2) the length of treatment of each group is different, and (3) the degree of infectivity is different in the different groups. This will become clearer as the signs, symptoms, and treatment of the main types of leprosy are described in the next few pages.

DESCRIPTION OF MAIN TYPES OF LEPROSY

Figure 3.4 INDETERMINATE LEPROSY	
CASE HISTORY (Length of time, signs or symptoms have been present). Short, 3-6 months maximum	
SKIN LESIONS	
	<p>Patch only, few, 2-3 at most</p> <p>Edges not well defined</p> <p>Surface flat</p> <p>Loss of feeling slight</p>
NERVE TRUNKS	Not involved
SMEARS	Negative

Description of an Indeterminate Case:

Skin Patches: The indeterminate case shows only one, or two, or three at the most, flat patches on the skin. The patch may be slightly red or paler than normal, and the edges are not clear but seem to fade into the normal skin.

Insensitivity: There will also be slight loss of sensation. (Never diagnose a patch as being leprosy unless there is some loss of sensation.)

No M. leprae: It is not normally possible to find leprosy bacilli in patches of indeterminate leprosy. This means that smears will be negative.

What to do when in doubt: If you are in doubt as to whether a patch is due to leprosy or not, and you cannot easily send the patient for expert advice, then it is wise to wait and see

what happens. These cases do not progress rapidly and you will do no harm to the patient if you ask him to return in three months' time, and leave him without treatment for this period. If the lesions are still present or have increased in size or number and show some loss of sensitivity, then start treatment.

Management of Indeterminate Leprosy: Once you are sure it is leprosy, treat for a total of three years according to the schedule used in your local programme. If left untreated most cases of indeterminate leprosy will probably heal, but it is impossible to tell simply by looking at the case whether self-healing will happen or not. Because treatment is easy at this stage and always effective, these patients should be treated, if you are sure it is leprosy.

TUBERCULOID LEPROSY (T)

In most parts of Africa this is the commonest type of leprosy. It is not infectious. It is sometimes self-healing, but many cases slowly become worse without treatment.

Description of a Tuberculoid Case: (See Fig. 3.5)

Skin Patches: Skin patches in tuberculoid leprosy have the following characteristics: (1) their number is usually few; (2) may be raised or flat; (3) the edge of the patch is well-defined; (4) the surface of the patch is dry; (5) there is always some loss of feeling on the patch; some-

Nerve Damage: Nerve damage occurs early in tuberculoid leprosy but, fortunately, is usually limited to one, or two nerve trunks.

Management of Tuberculoid Cases: These cases must be treated for one and a half to two years after all signs of activity have ceased. See signs of activity below. Some cases are self-healing without drug treatment, but it is not possible to recognize, when cases are first seen, which ones will heal without treatment. Therefore, it is wise to treat all cases of tuberculoid leprosy.

Signs of Activity: Tuberculoid cases (and other types) may be **active** or **inactive**. Activity can be recognised at once. But you cannot be sure a patient is **inactive** until you have watched him

Figure 3.5 TUBERCULOID LEPROSY

SKIN LESIONS



Usually few

Raised or flat, large or small

Well-defined edges, regular or irregular

Surface dry

Always some loss of feeling, sometimes quite marked

Often central healing

Some colour change in patch, red or pale

Asymmetrical

NERVE TRUNKS

Sometimes one or two trunks involved early

SMEARS

Negative

times this is quite marked but on the face it may be very slight and difficult to detect; (6) often the centre of the patch may show healing; (7) usually there is some colour change in the patch, either red or pale, or red at the edge and dark in the centre; (8) their distribution is asymmetrical (do not appear in the same general areas on the two sides of the body); (9) the patches may be large or small in size, regular or irregular in outline; (10) healed patches almost always leave scars.

for three to six months. Activity shows:

- Increase in size or numbers of patches.
- Redness, especially at the edges of patches.
- Changes in the thickness of the patches.

They may be either thinner or thicker.

No case should be discharged from treatment during pregnancy or within six months of delivery of the baby. Cases which have improved and seem inactive sometimes become worse at these times.

LEPROMATOUS LEPROSY (L)

In complete contrast to tuberculoid cases, which have very few or no *M. leprae* inside their skin, and show strong resistance to the disease, lepromatous cases show almost no resistance and therefore have innumerable (very, very large numbers) of *M. leprae* in the skin (see Fig. 3.2 again).

To begin with the skin lesions are flat, numerous, poorly defined, slightly red and shiny. They are difficult to see. They contain large numbers of leprosy bacilli. As the disease progresses, these skin lesions join together until the whole body surface of the patient is covered with leprosy lesions. At this stage it may also be difficult to recognise cases because there is little or

Figure 3.6 LEPROMATOUS LEPROSY

SKIN LESIONS

Many different kinds of lesions, e.g.



Too many to count

Nodules, especially on lower one third of ears

Raised patches

Flat red patches

Areas of thick skin

OTHER ORGANS INVOLVED



Eyes

Hands and feet

Testicles

NERVE TRUNKS

Many involved, but late in the disease

SMEARS

Strongly positive

Description of a Lepromatous Case: (See Fig. 3.6)

Skin Lesions: The skin lesions in lepromatous leprosy are polymorphic, that is they show very many different forms. A single case will show perhaps half a dozen different forms of skin lesions at one time, and frequently more forms, during the whole course or duration of the disease.

no normal skin left with which the affected skin can be compared. However, the skin under the arms (axilla) and high up on the inner side of the legs (groin) is frequently not invaded by leprosy. Compare the skin of these two areas with the skin of the rest of the body. Diagnosis in these early stages is difficult but important because these are the cases which are infecting other people.

As the disease progresses even more, the skin begins to be heaped up, and nodules and thick patches appear. Nodules are first seen at the edges of the ears, the edges of the nose, backs of the elbows, hands and knees. Later, nodules may be very widespread indeed. Later still, the skin becomes very ridged and thick, and the patient shows the classical Leonine facies (face like a lion). Patients also frequently lose their eyebrows, but this is not a reliable sign. Diagnosis at this stage is easy, but too late for the best protection of other people, and therefore too late for good leprosy control. Eyes, nose, mouth, throat, and, in men, breasts and testes, are also affected (Fig. 3.6), because the innumerable *M. leprae* go into all these parts of the body. (See examination details in Section 2.)

Nerve Damage: Nerve trunk damage occurs late in lepromatous leprosy, usually about nine years after the disease has started. Early diagnosis and early treatment could probably prevent this nerve damage. In addition, the leprosy process in the skin damages the nerves to hands and feet, and loss of feeling occurs as well as loss of hair, loss of sweating, and thinning of the skin. This primary damage will lead to the secondary damage described in earlier sections, unless you teach patients how to avoid it.

Damage to the Eye: This occurs in three ways in lepromatous leprosy cases: (1) as a result of the presence of *M. leprae* in the eyeball; (2) as a result of the eye being sensitised (made allergic by *M. leprae* elsewhere in the body); and (3) secondary to involvement of nerve trunks. This secondary damage to nerve trunk results in (a) loss of feeling in the cornea, and (b) lagophthalmos (see Section 2). These three types of damage are further discussed below.

(1) ***M. leprae* in the Eye:** (a) Nodules may grow on the conjunctiva, especially in cases resistant to DDS. (See Section 5.) These nodules may invade the sclera and the cornea, and are easily seen. (b) Nerves in the cornea may be damaged, and this may lead to opacities (lack of transparency) in the cornea. (c) The iris may be

involved in three different ways. (i) Tiny white deposits may be seen. (ii) Lepromatous nodules may be seen. (iii) *M. leprae* may cause chronic inflammation in the iris, leading to pain, photophobia (pain when in bright light), tearing (excessive tears) and reduced vision. The redness of the eye will be most marked at the limbus (junction of the iris and cornea), a cloudy cornea. There is also a small and often ragged (uneven) pupil. The iris may become stuck to the lens. (See Fig. 2.8 for details of these eye structures.)

(2) **Sensitivity to *M. leprae*:** As part of the Type II or ENL reaction (see Section 4), eyes may become suddenly inflamed with symptoms of pain, tearing, photophobia and reduced vision, and signs of redness around the entire limbus, cloudy cornea, and often a small irregular pupil. This type of red eye has the same signs and symptoms as described in (c) above, but it is much more acute.

(3) **Damage Secondary to Nerve Involvement:** This is described in Section 2. Treatment by exercises is described in Section 6.

Damage to Other Organs: Signs of possible damage to other organs in lepromatous leprosy has been described under examination procedures in Section 2.

Management of Lepromatous Cases: Management of lepromatous leprosy is difficult and prolonged. Patients need many, many years of treatment, and some authorities recommend that lepromatous cases should be treated for life. Certainly a case should continue to be treated until he has had negative skin smears for at least ten years.

BORDERLINE LEPROSY (B)

These cases come in between the lepromatous and the tuberculoid cases, and show some of the characteristics of both. These cases have many bacilli and moderate resistance. This moderate amount of resistance ("fighting") may result in a great deal of damage. Borderline patients have many skin lesions and often severe deformity as a result of nerve damage.

Figure 3.7 BORDERLINE LEPROSY

SKIN LESIONS	Very many Edges may be well-defined Outline often irregular Raised or flat Some loss of feeling No healing centre Symmetrical
NERVE TRUNKS	Often many involved fairly early
SMEARS	Range from negative to positive

Description of a Borderline Leprosy Case: (See Fig. 3.7)

Skin Patches: Skin patches in borderline leprosy have the following characteristics: (1) Their number is large, but they are not innumerable. They may be five to twenty to twenty-five or more in number. (2) They may be raised or flat. (3) Redness is a marked feature of raised patches. (4) The edge of the patch may be well defined, and is often irregular. (5) The surface of the patch is or may be dry. (6) Loss of feeling may be very slight. (7) The centre of lesions rarely shows central healing. (8) The distribution of patches shows at least some symmetry. (9) In some cases, some of the plaques may have areas of normal skin in the centre. (See Fig. 2.1—Plaque with “punched out” area). (10) In a treated case, lesions heal completely and may leave no signs of former lesions.

Nerve Damage: Nerve damage may occur early or late and is often severe. It also often involves many nerves and is usually symmetrical.

Nerves may be (1) large or small, (2) hard or normal, and (3) tender or not tender, depending on stage in the disease at which the case is being examined.

Management of Borderline Leprosy Case: Be very careful with these patients. Teach them how to recognize early signs of reaction. Always examine frequently for neuritis. (See Section 4.) Continue treatment for three or four years after all signs of activity have ceased.

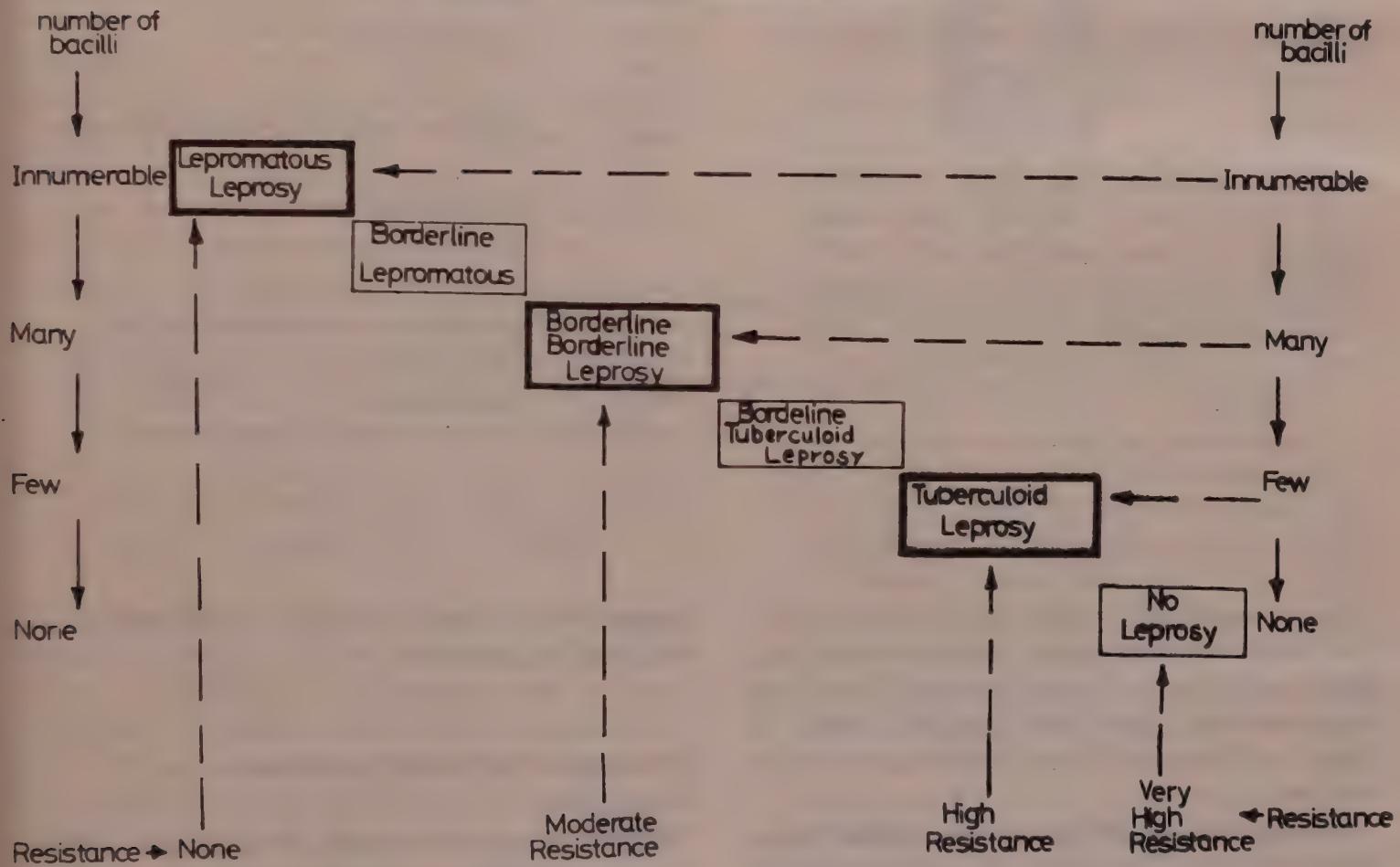
VARIETY IN BORDERLINE CASES

The borderline type of leprosy includes a great variety of cases. Many leprosy control programmes now use a plan of classification which divides borderline cases into three groups. (If your programme does this, read on. If your programme does not subdivide borderline cases, skip the next pages, and start reading again at the Section: “Uses of Classification in Rural Programmes”.)

The three groups of borderline cases are: borderline tuberculoid, borderline borderline, and borderline lepromatous. This may sound confusing at first. But it will become clear as you read on. These three types of leprosy, BT, BB and BL, are very important sub-types of the main group of borderline cases. (See Fig. 3.8.) From the point of view of patient care and leprosy control, it is important to recognize them as being different.

dry; there is always some loss of feeling; some patches have healing centres; there is usually loss of skin pigment (colour); patches may be raised or flat, and may be red in colour. The number of patches is five or more. The distribution of the patches is symmetrical with very marked symmetry on the limbs. Nerves are very commonly involved. The patient may show very many nerve trunks slightly enlarged, hard and tender. The extent of the damage depends on the stage

Fig. 3.8 Five Main Types of LEPROSY



BORDERLINE TUBERCULOID CASES: BT

(See Fig. 3.9)

The main differences between these cases and tuberculoid cases are that in BT cases, the number of lesions is greater, the distribution is more symmetrical and nerve damage is often severe. The individual patches in BT cases are similar to those in Tuberculoid leprosy cases, i.e. the edges are fairly well-defined; the surface is

the disease has reached when you see the patient. Early cases may just show enlarged, tender nerves. Late cases will show severe signs of nerve injury. Unfortunately, even cases which are diagnosed at an early stage with no signs of nerve injury may develop severe damage and disability during treatment. This damage may occur either during a reaction (see Section 4), or may occur silently, that is, without the patient noticing

Figure 3.9 BORDERLINE TUBERCULOID LEPROSY

SKIN LESIONS	<p>Many: five to twenty-five</p> <p>Edges may be well defined</p> <p>Outline usually irregular</p> <p>Usually flat</p> <p>Some loss of feeling</p> <p>Symmetrical, especially on arms and legs</p> <p>Some healing centres</p>
NERVE TRUNKS	Often involved with severe deformity of face, hands and feet
SMEARS	Usually negative

what is happening, because it is painless. The possibility of silent nerve damage is one very good reason why it is important to (1) examine cases carefully when you first see them, (2) make good records, and (3) re-examine them frequently.

Management of Borderline Tuberculoid Cases: Never forget the possibility of reaction or silent nerve damage in these cases (see Section 4). These reactions are of Type 1 (Reversal Reactions), and may damage nerves very rapidly indeed. It is important to recognise the reaction early and send the patient to hospital. In fact, it is wise to teach such patients beforehand to recognise possible reaction signs early and to come for help quickly.

Treat patients with standard doses of DDS for three to four years after signs of activity have

ceased. For cases in reaction, management is described in Section 4.

BORDERLINE BORDERLINE CASES: BB (See Fig. 3.10)

These cases are rather rare. The reason is that they are unstable and patients do not remain BB type for very long. They become either definitely BT or BL. These cases have (1) large numbers of dome shaped lesions or (2) well-defined plaques some of which have punched out areas of normal skin within the plaques, or both types of lesions (3) nerves may or may not be badly affected.

Management of Borderline Borderline Cases
Refer these cases to hospital. Most of the BB patients, if not all, will be in reaction, and need expert medical care.

BORDERLINE LEPROMATOUS CASES: BL

(See Fig. 3.11)

The main difference between borderline lepromatous cases and lepromatous leprosy cases is that the lesions show only moderate asymmetry. The patients often give a long history. Many of them will say that the disease began with a single pale patch. The cases show a wide variety of different sorts of skin lesions. Read again the definitions of different lesions in Section 2 and see Fig. 2.1. Infiltration and nodules are often found on the head and the lower arms and legs. Plaques are found on the face, on arms, including the upper arm and on legs, including the thighs. Well-defined macules may also be found especially on the trunk and buttocks. Nerves are usually enlarged and signs of peripheral nerve injury may or may not be present.

The following features help to distinguish these cases from true lepromatous leprosy:

- (1) The distribution of the lesions is not as symmetrical as in lepromatous leprosy.
- (2) Eyes, nose, mouth, testes are not involved.
- (3) Nodules on the ears involve the upper third of the ear rather than the lower third.
- (4) The bacteriological index from examination of smears is very variable, in some sites 0 or negative, and +5 in others.

Management of Borderline Lepromatous Cases: BL cases may show reactions of Type I or Type II (see Section 4 for management of cases in reaction). Nerve damage during these reactions does not occur as rapidly as with BT cases and with proper care can often be reversed. BL cases should be treated for four to five years after all signs of activity have ceased and their skin smears have become negative.

THE USES OF CLASSIFICATION OF CASES IN RURAL PROGRAMMES

There are three ways you can use the classification which should help you to serve your patients better. Classification helps you to know:

1. The probable length of treatment. Indeterminate and tuberculoid cases, if they take DDS treatment regularly, and in proper doses, can stop treatment after all signs of activity have been absent for one and a half to two years. Borderline patients should continue DDS treatment for three to five years after all signs of activity have ceased. Lepromatous patients must continue treatment for at least ten years after all signs of activity have ceased, and some doctors recommend DDS for life.

2. Treatment complications which may result. If health workers know that a patient is a borderline case, particularly borderline tuberculoid, then he knows that he must watch this patient particularly carefully for sudden signs of neuritis (see Section 4). He should also teach the patient the great importance of coming to the clinic immediately for help if he has signs of neuritis. Only then can severe deformity be prevented or minimised.

3. Infectivity. If you know that a patient is an infectious borderline lepromatous or lepromatous case, you also know that the patient can become non-infectious in 6-12 months if he takes DDS regularly. It is particularly important also to have each borderline lepromatous or lepromatous patient bring all his family and other close contacts to the clinic for examination. Health workers also know they must go out looking for the lepromatous or borderline patient who stops coming for treatment, since he is able to infect other people.

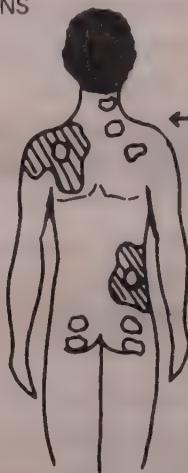
COMPARISON OF SYSTEMS OF CLASSIFICATION:

(See Fig. 3.12)

Doctors and research workers find still other values in classifying leprosy patients. They sometimes use systems which are quite detailed. These systems may require both clinical and

Figure 3.10 BORDERLINE BORDERLINE LEPROSY (BB)

SKIN LESIONS



Very many, usually more than 25

Edges usually well defined

Always raised and may be dome shaped with some "punched out" areas

Some large, many small

Little loss of feeling

Not as symmetrical as BT

NERVE TRUNKS

May not be involved

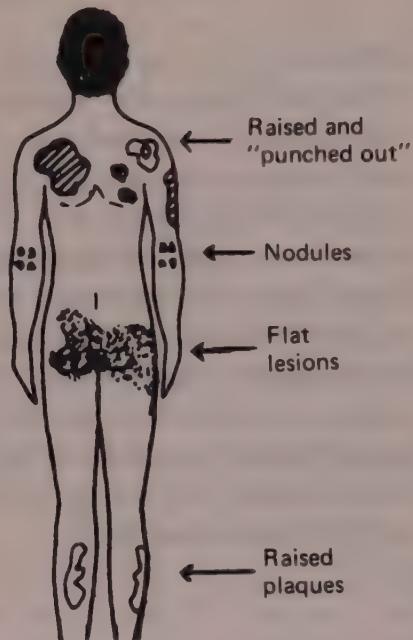
SMEARS

Slightly positive

BORDERLINE LEPROMATOUS LEPROSY (BL) See Figure 3.11

Figure 3.11 BORDERLINE LEPROMATOUS LEPROSY (BL)

SKIN LESIONS



Innumerable, usually

A variety of different lesions

May be flat and well defined, and/or raised and poorly defined with nodules also present

Not as symmetrical as LL

Often red

NERVE TRUNKS

Often enlarged

Often asymmetrical

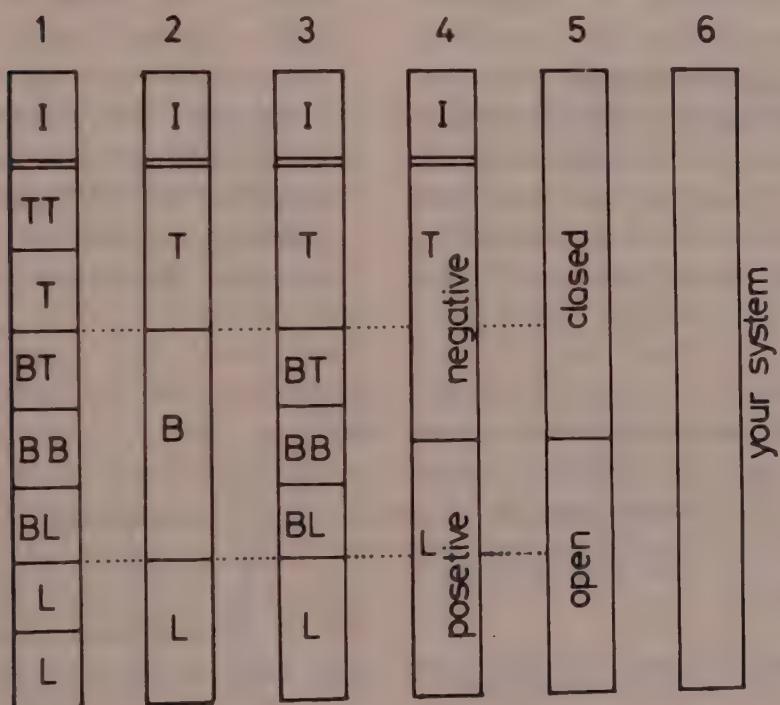
SMEARS

Marked positive in the lesions
Often negative elsewhere

laboratory tests. Laboratory tests are not often available in rural programmes. You will, of course, use the classification which has been chosen for your particular programme. However, the chart below shows some of the common classification systems, and shows how they are

related to each other. Circle the system you have been instructed to use. Or, on the far right, write in the different classification system you have been instructed to use. Space your squares in a way which will show how your system is related to the other systems.

Fig. 3.12 Comparison of Classification Systems



The classification systems described in this book are Systems Nos. 2 and 3.

Section 4 REACTIONS IN LEPROSY AND THEIR MANAGEMENT IN THE FIELD

Most leprosy patients can be treated in rural areas, with no need for hospital care. However, some do show signs or symptoms of complications. It is important to understand these complications, and to learn what you should do about them.

REACTION OR RELAPSE?

A **reaction** is a response to some stimulus. In leprosy the term **reaction** is used to describe several symptoms of sudden response by the patient's body to the disease. In leprosy **reaction**, only those parts of the body already infected by the disease are involved. Reaction cases must not be confused with **relapse** cases. In **relapse**, the leprosy is simply getting worse because of lack of treatment or because the patient is not responding to treatment, possibly because of DDS resistance. In **worsening** or **relapse** cases, the patient's disease is spreading to previously unaffected parts of the body, or simply getting more severe in parts already affected. Look

carefully at Fig. 4.1 to see the difference between **worsening** or **relapse**, and **reaction**.

Notice that in a reaction, the damage may be **sudden** and it may also be **severe**. Also notice that the treatment for reaction is quite different from the treatment of leprosy itself. Anti-leprosy treatment such as DDS is useless for treating patients in reaction. (Some doctors believe that DDS may actually be harmful during reactions.)

TYPES OF REACTIONS

Any type of leprosy may show reactions, but the form which the reaction takes is different in different types of leprosy. We do not know exactly what causes all reactions. We do know that the cause of reaction in **lepromatous leprosy** is quite different from the cause in other types of leprosy. This difference is described below. Some doctors believe that reactions may be caused by leprosy treatment. Others believe that treatment, especially by DDS, **does not cause** reactions. Everybody agrees that reactions do

Figure 4.1 Difference Between Worsening or Relapse, and Reaction

SIGNS	WORSENING OR RELAPSE	REACTION
Onset	Slow, weeks or months	Sudden (in hours), severe
Damage	Slow	Rapid, may be sudden especially in nerves
Site	New patches anywhere on the body	Usually only in patches or infiltration already present. New patches?
Tenderness	Not tender	Nerves usually tender Skin sometimes tender
Pain	Usually painless	Nerves often painful
Patient's general condition	Not affected	Often fever, joint ache, backache
Response to treatment	Slow	Rapid
Treatment	Anti-leprosy treatment, e.g. DDS	Anti-inflammatory treatment, including rest and drugs, e.g. Aspirin and Chloroquin

occur in untreated cases. Such reactions could not be caused by DDS, of course. Careful experimental work has shown that stopping DDS treatment makes little, if any, difference to the duration or severity of reactions. Stopping DDS unnecessarily during reactions causes patients to think that it was the DDS which caused the reaction. Also, after the reaction is over, leprosy workers may forget to start the patient on DDS again, or the patient may refuse to take the DDS. Then relapse will follow.

Do not forget that a reaction may be accompanied by some additional general disease such as malaria, or a localized disorder such as an abscess. When a patient is suffering from a reaction, always look and see if he also has another illness.

REVERSAL REACTIONS—TYPE I (See Fig. 4.2)

In all types of leprosy except lepromatous, the very great majority of reactions are due to a sudden increase in the patient's resistance to leprosy bacilli. We do not know what causes this sudden increase, but it does not seem to be related to DDS treatment, since sometimes these reactions happen even in untreated cases. These reactions are called reversal, or Type I reactions. A sudden increase in resistance means a sudden increase in the response of the body to the leprosy bacilli. This "fight" causes a sudden appearance of inflammation (redness, pain, and swelling) in the sites which are involved by the leprosy bacilli. These are most obvious in the skin. Some or all of the patient's patches will suddenly become red, swollen and tender. But this reaction is most important in the nerves. These become swollen, hard and painful; and it is useful to think of the nerves being as red and inflamed as the skin is, though nerves cannot be seen. This is neuritis, which is an emergency.

Neuritis (an emergency): In addition to the local signs of inflammation in nerves, nerve function is frequently reduced. The patient will complain, and you will be able to see that the muscles supplied by the affected nerves have suddenly

become weak or even paralysed. This type of reaction is an emergency. Treatment must be given immediately, if permanent damage to the nerves is to be prevented. Borderline tuberculoid cases are particularly susceptible to reversal reaction. You should warn all borderline cases of this susceptibility, and teach them to come immediately to the clinic or hospital.

Ideally, every patient with this sort of reaction should be in hospital within a day or two of it occurring, and certainly every patient should be immediately referred to hospital as soon as Type I reaction is seen. Temporary treatment which can usefully help the patient on the way to hospital includes a sling to rest the painful arm nerve, and drugs to suppress his pain. Drugs to cure the reaction, such as steroids, have dangerous side effects, and, if they are used in the field at all, should only be used to help the patient while he is on his way to hospital.

Not all cases with reversal reaction have the sudden violent and acute response which has been described here. Other cases are much more mild and less easily recognized, but, in the long run, they do just as much damage. Field workers must check regularly (1) on all patients with enlarged nerves, and (2) on patients whose nerve function is getting worse. Look especially for early muscle weakness. (See Section 2, Examination of Hands: Muscle Weakness.) The sooner this process is recognized the better. All these patients must be referred to your supervisor.

REACTIONS IN LEPROMATOUS LEPROSY (ERYTHEMA NODOSUM LEPROSUM—ENL)—TYPE II (See Fig. 4.2)

Reactions in lepromatous leprosy are probably due to an interaction (a "fight") between parts of dead leprosy bacilli and substances accumulating in the patient's blood and tissue fluids. Reactions occur when there is a suitable balance between the dead bacilli and these circulating substances.

ENL Reaction (Type II) in lepromatous leprosy shows in the skin in the form of red, tender and

often painful lumps. These lumps are known as erythema nodosum leprosum (ENL for short). It is important to realise that similar zones of inflammation are occurring in other parts of the body besides skin, parts which cannot be seen. In fact, such zones of inflammation can occur anywhere in the body where there are *M. leprae* and circulating substances. You will remember, leprosy bacilli can be found in nerves, eyes, testes, bones, muscles and liver, spleen and kidney, as well as in skin. Therefore you will understand that all parts of the body can be involved in an ENL reaction in lepromatous cases.

Clinically, in addition to red lumps in the skin, patients may have swelling of skin, pain and swelling of nerves, pain and redness in eyes, pain and swelling in nose, pain and swelling in lymph nodes and pain and swelling of joints. Liver and spleen may also be enlarged and tender. As a result of ENL involvement in any or all of these parts, the patient feels ill and may have fever. If the reaction is severe, the lesions may ulcerate. He may become very ill indeed, and may even die.

ENL reaction may occur at any time during the first four or five years of treatment. But it rarely occurs later than this in patients who continue taking regular treatment. It seems to be more common in patients with few remaining living bacilli but who still have large quantities of dead bacilli breaking up in their bodies. Any severe physical or emotional strain may also bring on an attack of ENL. Particularly severe reactions may occur following childbirth. A

patient with a severe ENL reaction may get repeated attacks. A new attack may occur before the previous attack is over. And so, he may appear to be having one long continuous reaction. The severity of the attack can be seen by the general sickness of the patient, his temperature, and the number and size of the red lumps. In especially severe cases, the red lumps may occur all over the body, but usually they are seen on skin of arms, head and legs only. Also in severe cases, the red lumps may break down and form ulcers called necrotising ENL, meaning dead tissue. Other ways to measure severity of the attack include the extent of involvement of nerves, eyes, testes, lymph nodes and joints.

Management of ENL: Patients with severe ENL reactions, certainly those with painful nerves or eyes, or those with increasing weakness in their limbs or increasingly poor vision, must be immediately sent to hospital. This is because in these cases there is a very real risk that the weakness may become a permanent paralysis, or that eyesight will be seriously or permanently damaged, or that the patient may die.

Mild ENL attacks last only about ten days. Patients with mild reaction, provided there is no involvement of nerves and eyes, may be advised to rest at home, and most will recover. There is no need to interrupt their DDS treatment. Aspirin may be given if the patient has headache or other minor discomfort.

Figure 4.2 Summary of Reaction Types

TYPE	CLASSIFICATION	NERVE SIGNS	SKIN SIGNS	MANAGEMENT
Type I REVERSAL	Occurs in B.T., B.B. B.L. cases	Nerve damage common, and usually obvious	Existing lesions become red and raised	Send to hospital at once
Type II ENL	Occurs in LL and BL cases	Nerve damage not common Eyes, joints, testes may be involved	Fresh, red lumps appear	Many cases are mild and respond to rest and aspirin. Severe cases send to hospital

Section 5 DRUG TREATMENT OF LEPROSY

TREATMENT OF LEPROSY WITH DDS (Diamino-diphenyl-sulphone)

Specific dosages and specific time schedules which you are to follow for DDS drug treatment of leprosy in your control programmes are not included in this guide, because practice varies from place to place. Your supervisor will give you the treatment schedule you are to follow. However, there are certain basic principles which you need to understand.

A useful way of thinking about patients under treatment is to compare them with a man walking along a rather narrow bridge. Always the goal at the other end of the treatment bridge is cure. If he steps off the bridge to one side or the other then he is in difficulties. In terms of treatment, the dangers he will face on one side of the DDS bridge will be due to over-treatment, and the dangers he will face on the other side will be due to under-treatment.

Dangers of Over-Treatment with DDS: The dangers of over-treatment include (1) toxic effects of DDS, and (2) the results of the patient becoming unusually sensitive to the drug.

(1) Toxic effects are really only seen in patients taking 200 mg a day or more. Anaemia is a complication of DDS treatment, but only when really high doses are used. However, most cases of anaemia in leprosy patients are not due to DDS treatment but to some nutritional or other cause. As was mentioned in Section 4 on reactions, it now seems unlikely that reactions are due to toxic effects of DDS treatment.

(2) **Unusual Sensitivity to DDS Shows in Three Ways:** (a) purple-black patches, (b) exfoliative dermatitis, and (c) temporary mental unrest.

(a) Purple-black patches on the skin are called fixed drug reactions; this is a very minor problem.

(b) Exfoliative dermatitis is a very serious problem, but only occurs in the first three months of treatment. In exfoliative dermatitis, the patient becomes ill and his skin becomes red and scaly. If you suspect exfoliative dermatitis

stop treatment immediately, and refer him to your supervisor.

(c) Some patients become mentally restless, especially if they are taking large doses once a week. They sleep poorly, become excitable and frightened and may feel that other people are against them. In these patients also, treatment should be stopped until your supervisor can see the patient.

Dangers of Insufficient Treatment with DDS: It has been proved in different parts of the world that patients do not take the total dose of DDS regularly as it is prescribed for them. The same phenomenon has been observed in the treatment of pulmonary tuberculosis. For this reason it is better to prescribe daily doses of DDS rather than weekly or twice weekly treatment.

DDS Resistance: DDS resistance (i.e. secondary resistance) becomes more and more important in the treatment of lepromatous patients. Many authorities are now recommending dual or even triple therapy for the first year in the treatment of lepromatous cases. Primary resistance (i.e. infection by a strain of *M. leprae* which is already resistant to DDS before any treatment with DDS) is, up to now a very rare phenomenon. But it may develop as a very serious problem in the future.

This primary resistance can be detected by the fact that a patient does not respond to DDS treatment as would be expected.

Recognition of Primary DDS Resistance: Recognise these DDS resistant cases by:

1. The history of their treatment: DDS dosages and duration.
2. The appearance of new nodules and infiltrations while the patient is still taking DDS regularly.
3. The location of the nodules in unusual sites, e.g. abdomen, forearms, and on the white of the eye.

4. Increase in BI and MI readings of smears while the patient is still taking DDS.

Many cases which are not doing well on low doses of DDS will improve if given full doses (i.e. 100 mg daily). These cases are only partially resistant, but will become completely resistant unless they are changed to full doses of DDS plus another drug at once.

TREATMENT WITH OTHER ANTI-LEPROSY DRUGS

There are other anti-leprosy drugs besides DDS. Notes on the ones you are most likely to be told to use are given below.

Thiambutose: This drug is not expensive, has no toxic effects and is effective against *M. leprae*. The only problem with its use is that if it is used alone, lepromatous leprosy cases become resistant to it in one and a half to two years. It should, therefore, never be used alone for lepromatous leprosy cases, nor should it be used in combination with DDS for treatment of cases already resistant to DDS. It may have a place in the early treatment of fresh lepromatous cases together with DDS. Some workers feel that it is less likely to give rise to reaction than DDS, and so use it for cases in the BL group. Dose: 1 g twice daily by mouth.

Clofazimine (Lamprene): This drug is a red dye. It has no serious side effects, and no serious toxic effects. It is very effective but it is expensive. It is the standard treatment used for cases resistant to DDS, but in these cases it should be combined with another drug for at least the first few months of treatment, e.g. thiambutose. It is no more effective in treating fresh cases of lepromatous leprosy than is DDS. It has the unusual property of protecting lepromatous cases

against reaction (see Section 4) and is often used in cases which have had severe Type II reaction. It has not been proved to have any significant effect on Type I reactions, though many workers feel that patients with Type I reactions do better with clofazimine than with DDS.

Streptomycin: Streptomycin is effective but expensive and, may cause deafness. Resistance to streptomycin used alone develops rather quickly. It should not be used alone to treat lepromatous leprosy cases but may be used in combination with another drug, e.g. clofazimine.

Rifampicin: This is the most rapidly acting drug, but it is also very expensive and has many side effects, some of which are dangerous.

Treatment of DDS Resistant Cases

These patients must be treated with a combination of drugs under medical supervision. Your main task is to recognise these resistant cases, and refer them to your supervisor for him to test, and decide what treatment is needed.

DDS TREATMENT SCHEDULES

The question as to whether patients should be on daily or weekly DDS treatment and whether they should have DDS by mouth or by injection is very much discussed by leprologists. Different regimes seem to be more suitable for different parts of the world. You will be guided by your local supervisor in this respect.

Summary of Drug Treatment

Leprosy clinic workers will not be expected to make decisions regarding choice of drugs or dosages. They will be given specific instructions according to the local programmes.

Section 6 MANAGEMENT OF COMPLICATIONS OTHER THAN REACTIONS

Complications of feet, eyes, wounds, and the roles of exercise and surgery are presented in this Section. Reactions were discussed in Section 4.

TWO KINDS OF DAMAGE—A REVIEW (See Fig. 6.1)

The symptoms and signs of damage and deformity are usually divided into two groups: (1) primary damage and (2) secondary damage (see Section 2).

PRIMARY DAMAGE

Primary damage is caused by *M. leprae* attacking nerves, skin, and mucous membranes. This can lead to (1) infiltration or thinning of the skin and mucous membranes of the nose and throat, (2) loss of sweating, (3) loss of feeling, (4) muscle weakness and even complete paralysis, and (5) neuritis.

Primary damage can be prevented, but only by early diagnosis, and regular and effective treatment. Some types of acute primary damage, such as neuritis, can be reversed, but only if the patient gets immediate and effective treatment in hospital (see Section 4). This prevention is far more satisfactory than later attempts to manage the complications which were allowed to follow the primary damage.

SECONDARY DAMAGE

Secondary damage is not due directly to *M. leprae*. It follows the primary damage which was not prevented by early drug treatment. It shows in different ways:

1. **Contractures:** These result from lack of motion or use of joints, and include muscle, ligament and skin shortening.
2. **Wounds:** These are the result of injury, and may be either closed (not visible on the surface, but inside) or open (visible).

3. **Loss of Tissue:** This follows wounds and is often accompanied by infection. It is also seen in the wasting of muscle tissue following muscle weakness and paralysis.

4. **Other Deformities:** Infection is the cause of most other deformities, such as loss of fingers and toes and collapse of the nose. However, all wounds heal with some scarring, and scar tissue always contracts. These contractures result in further deformity.

Secondary deformity can be prevented if the patient is taught to take care of his limbs, and if his wounds are properly treated early. Useful exercises to prevent contractures are described in this Section. Information about health education is provided in the ALERT booklet "A GUIDE TO HEALTH EDUCATION IN LEPROSY".

Again prevention of secondary damage is more effective than treating its complications. Health workers should consider their efforts to help patients to prevent secondary damage and deformity as time well spent.

PREVENTION OF WOUNDS

The really important fact to remember is that relatively simple methods of care of anaesthetic hands and feet will prevent the development of most crippling deformities. The patient should be taught to keep the skin of his feet clean, soft, and flexible by daily soaking and application of oil. He should wear suitable shoes at all times, and should keep them in good condition. He must not walk long distances if he can possibly avoid it, and he should learn to walk with short steps. He must be especially careful to keep his feet away from fire and hot objects of any sort. He should examine his feet every day, particularly looking for "hot spots", which can be felt before the wounds which lead to infection actually show on the foot. See also "A GUIDE TO HEALTH EDUCATION IN LEPROSY".

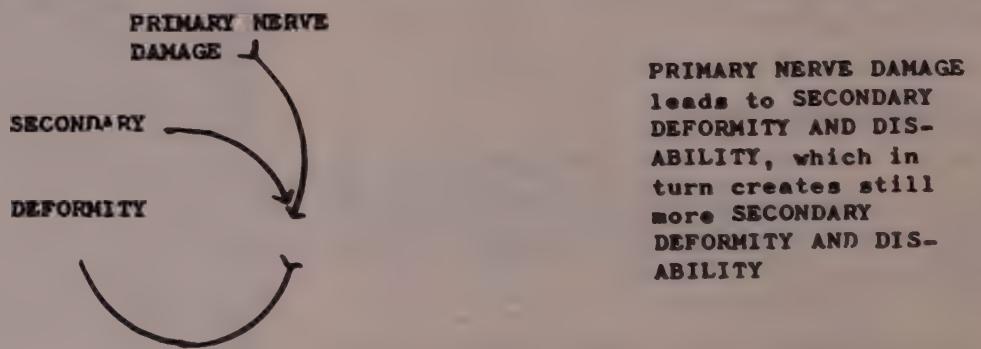
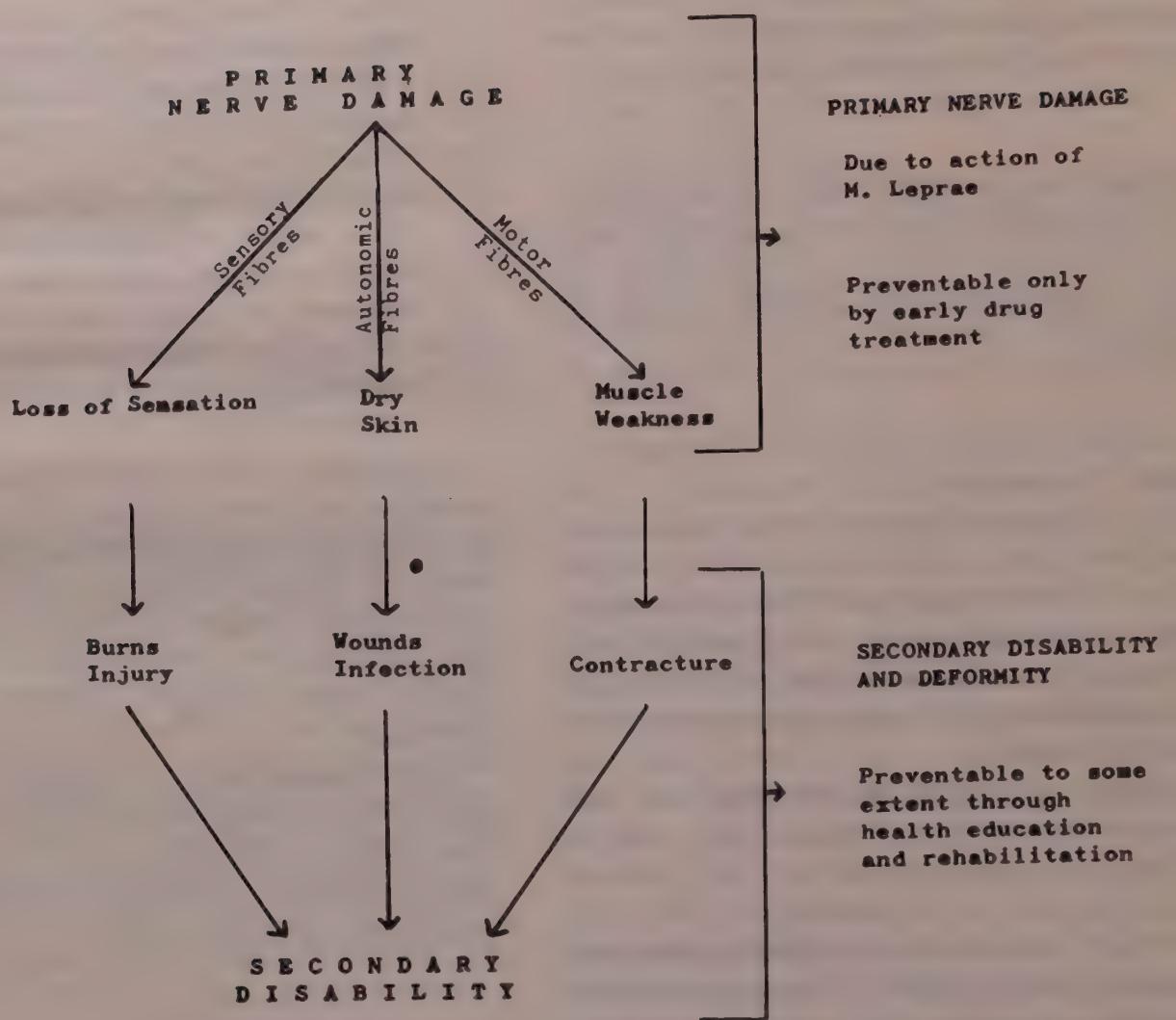


Figure 6.1 The Cycle of Deformity

TREATMENT OF WOUNDS (See also "A GUIDE TO HEALTH EDUCATION IN LEPROSY")

There are five principles to be followed, and never forgotten:

1. **STOP** the injury which is the cause of the wound. Burns on fingers following smoking will not heal if the patient continues to smoke and burn his fingers. Ulcers on feet will not heal if the patient continues to walk long distances with long steps.
2. **PREVENT** infection. Simple cleanliness is often sufficient. Soap is a most efficient antiseptic. Cover a wound with a clean, dry cloth and keep it clean and dry!
3. **REST** the part which has been injured. Splint and sling wounded hands. Rest wounded feet: in bed, with crutches, or in Plaster of Paris casts.
4. **TREAT** infection if it is present. Use soap and water, or saline (a handful of salt in a bucket of water) rather than expensive antiseptics.
5. **REFER** cases with deep infection to hospital. "Where there is pus (or dead bone) let it out. Where there is no pus (or dead bone) don't let it out." Operating on infected hands and feet is a job only for doctors.

Recognise cases with deep infection by:

1. Swelling or redness of the part.
2. Swelling and pain in lymph nodes in groin or armpits.
3. Fever.

Recognise pus and suspect dead bone by:

1. Swelling which fluctuates (sometimes present and sometimes absent).
2. Discharge of pus.
3. Discharge which continues after the wounded part has been treated with rest and soaking for more than 10 days.

ANAESTHETIC FEET AND FOOTWEAR

As explained in Section 2 "Examination of Feet", the foot with loss of feeling is at risk of injury. Most of the injuries are due to walking. Most occur first inside the foot as closed injuries, and only later become open wounds. All patients with loss of feeling in their feet need protective footwear. A few general statements can be made about the sort of shoes that are suitable.

1. The shoe should be made without nails, or at least without nails in places which touch the foot.
2. The shoe should fit well and not rub on the foot.
3. The insole should be soft and moulded so as to fit the foot exactly.
4. The shoe should look as normal as possible.

Fortunately, most of the feet we have to deal with are almost normal in shape. They simply have some loss of feeling, and, possibly, mobile scars from healed ulcers. These feet can be satisfactorily protected with strong shoes or sandals with a 20° shore microcellular rubber insole (MCR). Not all microcellular rubber is suitable. The type used must be springy but firm. Make sure there is plenty of room in the shoe or sandal for both the foot and the added microcellular rubber insole.

Open sandals are best in hot, wet climates. Closed sandals or shoes are best where the climate is dry or cold and wet.

These simple shoes are not suitable for feet that have had (1) many ulcers, (2) have rigid scars fixed to bones, or (3) are badly out of shape. Such feet need shoes specially made for each foot. These shoes must have moulded insoles, rigid outer soles, and a rocker action. Unfortunately, such shoes are sometimes unacceptable to some patients because of their appearance. A compromise is necessary between the shoe which is best but rejected by the patient and a shoe which is less desirable but which the patient will wear. This compromise is much better than the patient refusing to wear shoes at all.

The making and fitting of various types of shoes is fully described in the ALERT handbook on footwear.

TREATMENT OF EYES

Remember to teach every patient to examine his own eyes at least once each day; and try to make sure he really gets the treatment you have advised. Signs and symptoms of the conditions below are given in Section 2. Read them again. See also the ALERT publication "A GUIDE TO HEALTH EDUCATION IN LEPROSY".

A. Lagophthalmos

Early stages—exercises as given in this Section. Later stages—surgical treatment is necessary, either a simple sewing of the eyelids together (tarsorrhaphy) or transplantation of part of the temporalis muscle (which is never paralysed in leprosy) to enable the patient to close the eye.

B. Exposure and Dryness of Eye

1. Exercises or surgery if lagophthalmos is involved.
2. Artificial tears.
3. Eye shield at night.
4. Tape eyes shut at night.

C. Eye Infection (conjunctivitis) or Injury (corneal ulcer)

Chloramphenicol or tetracycline eye ointment 4 x daily. Refer all corneal ulcer cases to your supervisor as soon as possible.

D. Uveitis—Emergency Treatment

Atropine: 1-2% eye drops twice daily.

Refer all uveitis cases to hospital immediately. Hours saved are crucial. Learn the "A-B-C-Ds" of emergency treatment for uveitis:

A = Atropine

B = Blindness if you do not give Atropine.

C = Cortisone to be given in hospital.

D = Diamox, also given in hospital.

E. Leproma of the Eye

Cured by drug treatment for leprosy. However, remember the leproma may be a sign of drug resistance. Refer the patient to your supervisor.

1. THE PLACE OF EXERCISE

All patients with weak or paralysed muscles of hands or feet, and all patients unable to blink normally should be taught suitable exercises at the clinic when they come for their DDS. Each patient is checked to see whether there is any weakness or paralysis of the hands or feet, to see if he can move them into positions shown in Fig. 6.2, without assistance.

The clinic worker watches to see whether the patient blinks normally or not while talking with him, and checks whether he can fully close his eyes—if he cannot, he needs to learn eye exercises.

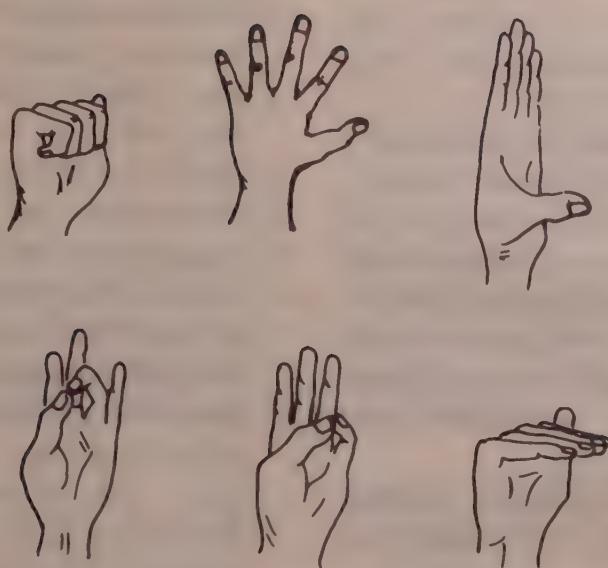
2. THE TYPES OF MOVEMENT USED DURING EXERCISE

- (i) **Passive Movement:** Such movement is usually performed by the other hand when it is used to push the hand or foot being exercised into the required position. Passive movements help to keep joints mobile.
- (ii) **Active Movement:** This is movement done without assistance, using the muscles of the part being exercised. Active movements strengthen weak muscles.

3. THE VALUES (OR BENEFITS) OF EXERCISE

- (i) **Prevent!** Passive exercises can prevent stiffness, once paralysis has occurred. Once stiffness has occurred, it makes use of the hand or foot more difficult.
- (ii) **Stop!** Passive exercises can stop further stiffness.
- (iii) **Improve!** Active exercises can improve the strength of all weak muscles, but com-

Fig. 6.2 Normal motions of the hand



Normal motions of the foot



pletely paralysed muscles cannot be strengthened.

Passive exercise can reverse stiffness, but only where the shortened tissue is still elastic.

4. STEPS IN TEACHING EXERCISES

(i) **Skin Care:** Patients learning hand and foot exercises usually have dry skin. They should soak and oil their hands or feet before starting to exercise. Soak the skin in water until it is soft, then rub in oil to prevent the water evaporation. Any local oil may be used as long as it does not attract rats or insects that might bite. Areas of thick skin should be thinned down using the fingernail or a soft stone to rub off the extra layer of skin.

(ii) **Select the Exercises:** First discuss with the patient any difficulties he has concerning his work, eating, or other problems relating to his deformity. Then select the three exercises which will help him most. Other exercises which might be useful can be taught later. Eyelid exercises, should always be a priority.

(iii) **Assess the Possibility of Improvement:** What can be expected from the exercises? Will they just stop the stiffness getting worse, or will there be improvement in function and appearance? Discuss this honestly with the patient.

(iv) **Teach the Exercise:** The clinic worker first demonstrates the exercise, then asks the patient to do it himself several times, make sure he has learnt correctly by asking him to demonstrate the exercise at

his next clinic visit.

- (v) **Encourage the Patient:** All patients need encouragement, to continue with their exercises.
- (vi) **How Often Should Exercises Be Done?** A few times, twice a day if the aim is to prevent or stop stiffness. This is enough if the skin is kept soft by soaking. Many times, if the aim is to improve muscle strength, or to reverse stiffness. The patient starts with gentle exercise and increases gradually to several periods maximum effort each day.
- (vii) **Do Not Do Exercise:** if injuries, or infection or cracks are present, or if nerves are painful or tender.

SIMPLE EXERCISES

A. Finger Exercises: Can the patient actively straighten his finger? If he cannot, teach him

finger exercise 1 and 2.

Finger Exercise No. 1.

Passively straightening fingers (see Fig. 6.3). The patient places the back of his clawed hand on a flat, padded surface or on his thigh. Then he uses the other hand to massage the fingers out as straight as is possible with steady pressure. As the patient does not feel how hard he is pushing he must take care not to crack the skin at the front of the fingers.

Finger Exercise No. 2.

Actively straightening fingers, with passive support at the base of the fingers (see Fig. 6.4). The patient places the back of the clawed hand on a flat, padded surface or on his thigh. Using the edge of the other hand, he then presses down firmly on the palm of the clawed hand to hold it firmly, and at the same time actively straightens his fingers as much as he can.

Fig. 6.3

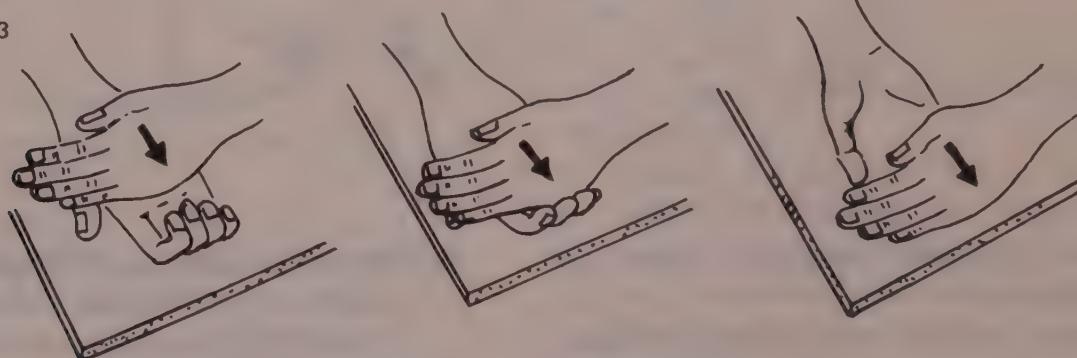
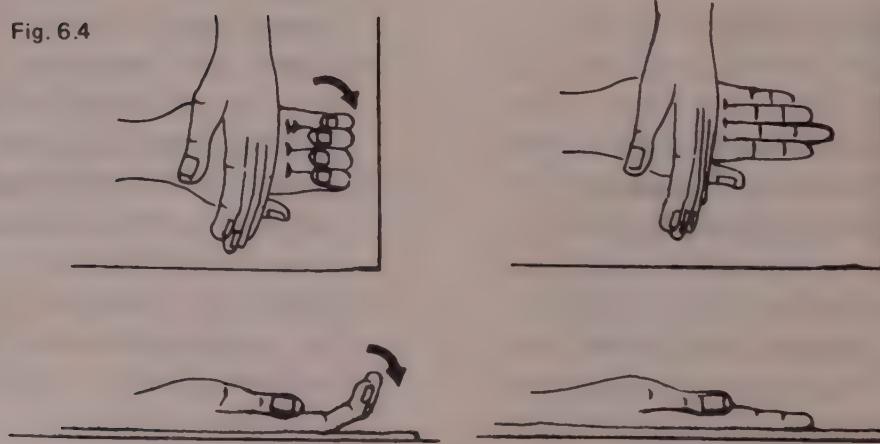


Fig. 6.4



B. Thumb Exercises: Can the patient actively straighten his thumb? If he can not teach him thumb exercises numbers 1 and 2.

Thumb Exercise No. 1.

Passive straightening of thumb (see Fig. 6.5). The patient takes hold of the clawed thumb between the thumb and index finger of the other hand. He then massages the end joint as straight as possible, pulling the thumb lengthways. As he does this he should take care not to hyperextend (bend backwards) the second

thumb joint.

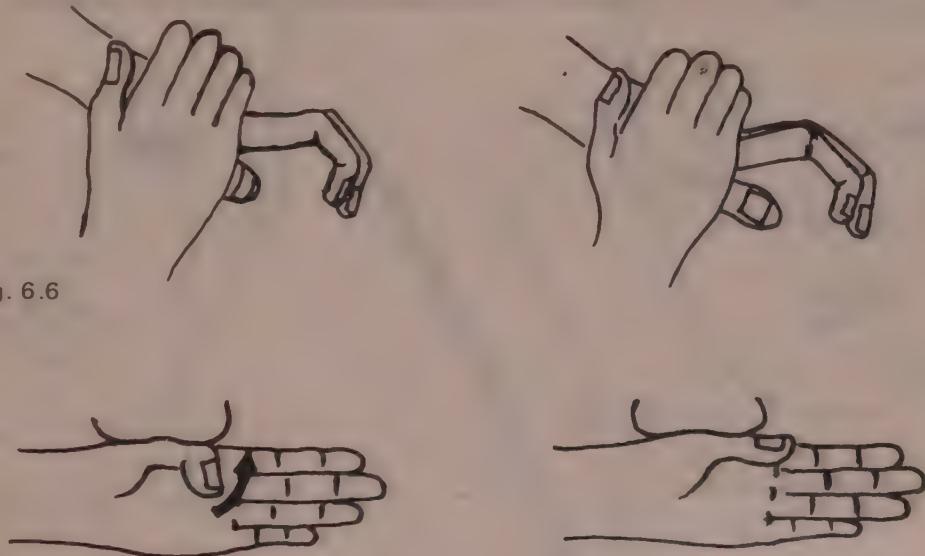
Thumb Exercise No. 2.

Active straightening of thumb with passive support of second joint (see Fig. 6.6). The patient places the edge of the clawed hand on the padded surface or on his thigh. Using the other hand he then presses down firmly on the back of the thumb in order to prevent hyperextension of the second thumb joint. Now he actively straightens the end joint of the thumb.

Fig. 6.5



Fig. 6.6



C. Foot Exercises: Can the patient actively turn his foot out (evert)? If he can not, teach him foot exercise number 1.

Foot Exercise No. 1.

Passive eversion (turning out) of the foot (see Fig. 6.7). The patient rests the heel of his foot on a chair or box. He grasps the outside (little toe side) of the foot just behind the toes. He then pulls the outside of his foot upwards towards his knee so as to turn the sole outward.

Can the patient raise his foot or does he

have a drop-foot? If he has a drop-foot teach him foot exercise number 2.

Foot Exercise No. 2.

Passive bending of the ankle by leaning against a wall (see Fig. 6.8). The patient stands facing a wall and about two feet (two-thirds of a metre) from it. Keeping his heels down and his knees straight he then leans forwards against the wall. If he has lost feeling in the soles of his feet the patient should keep his shoes on during the exercise.

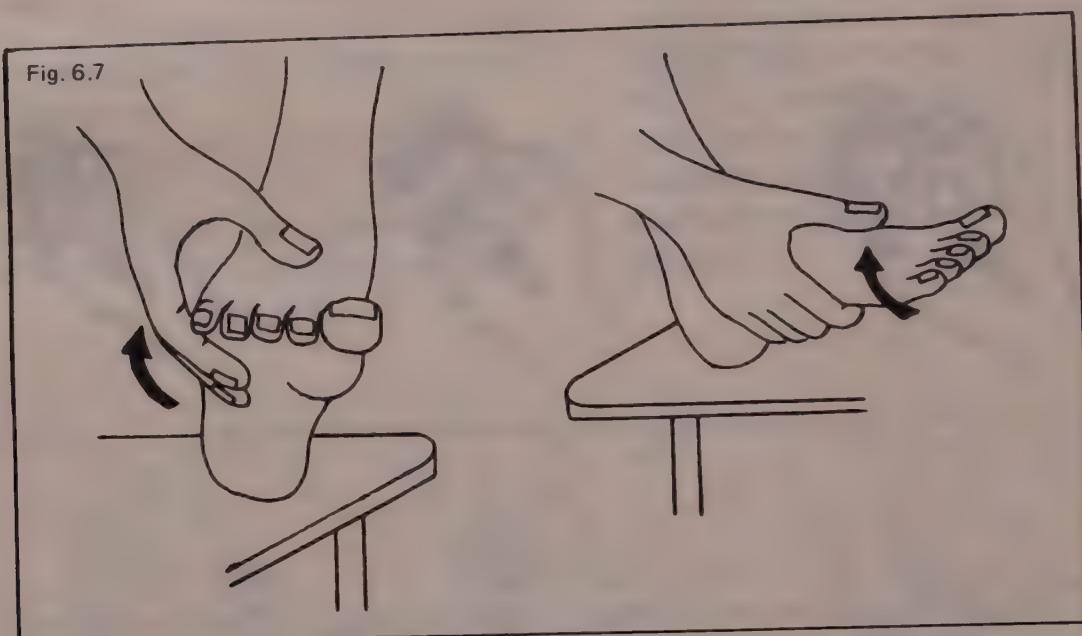
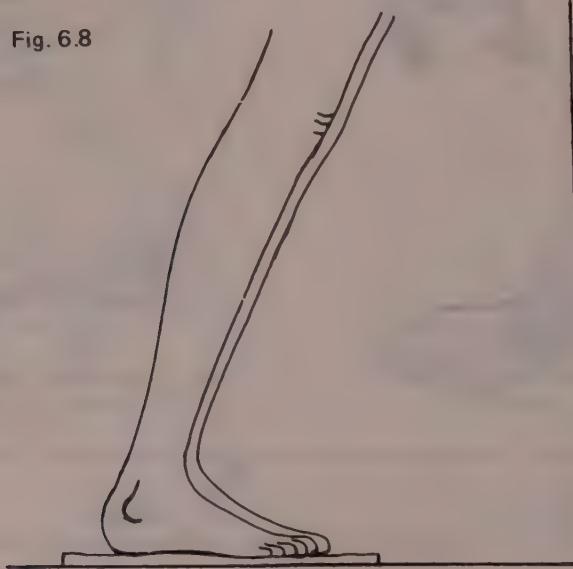


Fig. 6.8



D. Eyelid Exercises: Does the patient blink as you talk with him? If you lightly touch the surface of the eye with the tip of a soft, clean paper does he blink? If he does not, he needs to learn exercise No. 1.

Eyelid Exercise No. 1.

Blink retraining—the patient closes his eyes easily but as completely as he can, and holds them closed for a second to moisten the eyeball. He should be taught to do this many times each day.

Eyelid Exercise No. 2.

Eyelid strengthening (see Fig. 6.9). The patient should close his eyes as tightly as he can and hold them closed while he counts ten. He repeats this exercise 30 times, and should

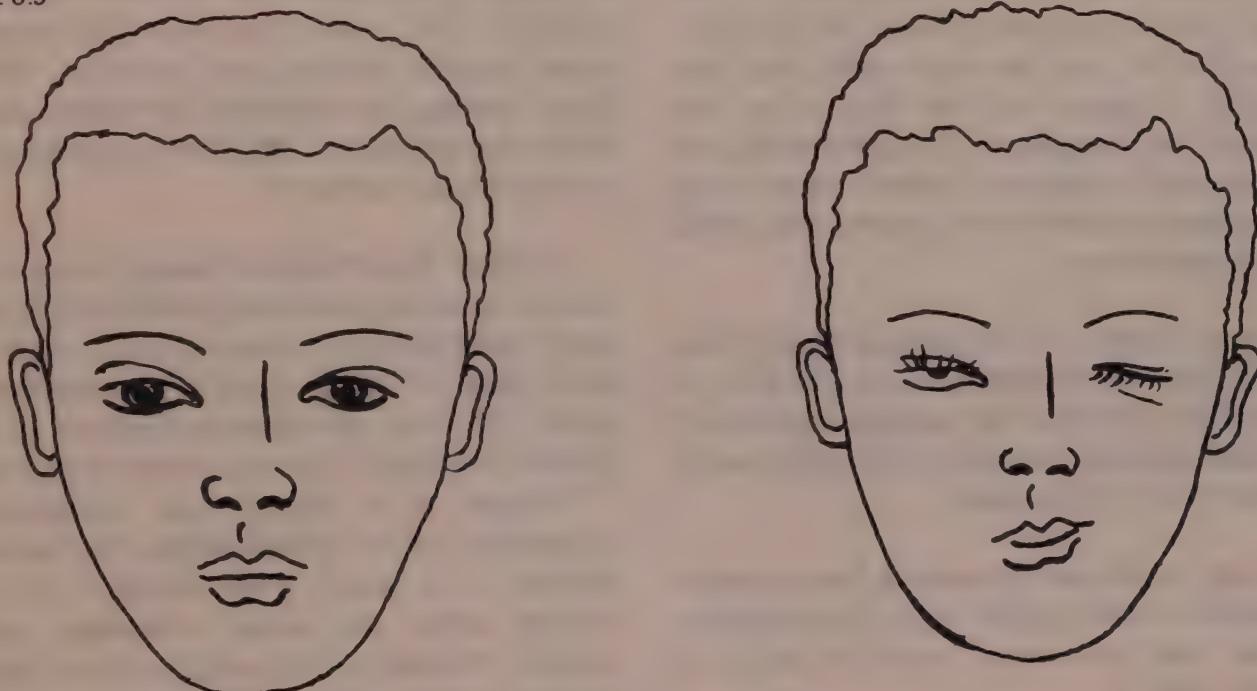
do it in the morning, mid-day and at night.

SURGERY FOR LEPROSY PATIENTS

There are many types of surgery which can help to overcome some of the deformities resulting from nerve damage, and from injuries resulting from anaesthesia of hands and feet. However, surgery is very expensive in terms of the patient's time lost from work, the cost of the hospital stay, and the small number of surgeons available in most areas.

Prevention of the need for surgery is more practical. Early, regular and long continued drug treatment can prevent deformity. Exercises done conscientiously by patients can prevent the need for surgery. Rural leprosy workers have a most important part to play in this prevention. Teach exercises to patients.

Fig. 6.9



Most types of surgery for leprosy patients require intelligent performance of pre-operative and post-operative exercises on the part of the patient. Without patients' enthusiastic hard work before and after surgery, many operations will not be successful. This means that surgery should only be done for patients who have (1) a real need for it, and (2) who have shown that they will be responsible in doing their part to ensure success. If rural leprosy workers understand this, they will be less likely to raise false hopes in patients about the miracles of surgery.

Guidance in Selecting Cases for Surgical Evaluation

1. Does the patient have a real need for surgery? Will he really **use** the improved function which surgery often provides? Surgery to provide good functioning **feet** is of more value to a farmer than hand surgery. A farmer can usually handle farm tools very effectively in spite of extensive damage to his hands, provided he learns how to take care of his hands and prevent further damage. But he must be able to walk long distances. A beggar will be able to get less money by begging if his deformities are corrected by surgery. Patients must be in positions to make use of surgery once it has been performed.
2. Eye problems requiring surgery should have **first priority**. Patients should be sent to hospital promptly for surgical assessment. Visual loss and complete blindness can be prevented in many cases.
3. Young, intelligent, interested, hard working patients usually profit most from surgery. They also have more years in which to profit from it.
4. Be sure that patients realise it is the **surgeon** who will make the decision as to whether surgery will be done. This can avoid disappointment in cases where the surgeon decides that surgery should not be done.

THE JOB OF LEPROSY FIELD STAFF—A CHALLENGE

The long term goal of leprosy control programmes is to prevent the spread of leprosy to healthy people, and therefore eventually to eliminate the disease. The responsibility of field staff is to prevent the spread of leprosy in their own particular areas.

Leprosy is a slow developing, long lasting disease. Leprosy patients cannot tell you their symptoms one day, be given the proper medication on the same day, and then be cured in a few more days. Instead leprosy patients must continue treatment for several years, if they are to stay non-infectious and unable to spread leprosy to other people.

You cannot carry out your leprosy control responsibilities effectively unless you can get your patients to co-operate with your programme **for years**. They will only co-operate **for years** if you really satisfy them in some way every time they come to your clinic. The most obvious way to satisfy them would be to cure their leprosy quickly. You cannot do this. You must find other ways to satisfy your patients, and keep them coming for treatment **for years**, and keep them non-infectious. What are some other ways to satisfy your patients?

(1) **Meet Your Patients' Needs.** Since leprosy is usually painless, swallowing DDS tablets does not really satisfy patients, even though it may satisfy your need to have a good clinic attendance record. You must take time to find out what each patient needs each time he comes to the clinic.

Perhaps it is seeing your sympathy and appreciation for the long distance he has walked. Perhaps it is seeing your concern for a small wound which he would otherwise not have noticed. Perhaps it is your pleasure at seeing the healing of a small wound because he followed the advice you gave him at the last clinic. Perhaps it is the way you helped the patient to discover how he could really do what you told him he ought to do, in the way of health education, instead of your just telling him, when you and he both were thinking that your advice was

impossible to carry out. Perhaps it is his confidence in you because you always seem to have the proper supplies on hand when they are needed. Perhaps it is his recognising your confidence in him when you give him twice as much DDS so that he will need to come to the clinic only half as often, and so avoid the long walk—unless he should have some complication and want to come sooner.

(2) Make Patients Feel Important. Too often leprosy patients are not accepted outside their own families, and even families sometimes reject leprosy patients. Show patients that you are really glad to see them each time they come to the clinic. Encourage village leaders, and teachers and students, to accept leprosy patients as important and useful members of the community. Encourage patients and villagers to share

responsibilities for smooth clinic organisation and daily clinic operation. Encourage patients and villagers to help you find contacts of infectious leprosy patients, or patients who have stopped coming to the clinic regularly. You need their help, and when they help they feel, and are, important.

COMBINE THE KNOWLEDGE OF LEPROSY INCLUDED IN THIS BOOK WITH YOUR OWN LOVING CARE FOR YOUR PATIENTS. ONLY THEN CAN YOU REALLY CARRY OUT YOUR RESPONSIBILITIES AS A FIELD STAFF MEMBER. YOUR COMBINATION OF KNOWLEDGE, SKILLS AND CONCERN FOR PATIENTS WILL ENCOURAGE YOU TO WANT CONTINUALLY TO IMPROVE YOUR SERVICES TO LEPROSY PATIENTS.

GLOSSARY

ASYMMETRY — lack of symmetry; differences between two sides of the body, which are normally the same
BACTERIOLOGICAL INDEX (B.I.) — amount of *M. leprae* present in the slide smear
CLAW HAND (TOES) — fingers (toes) bent with tips curled and middle knuckles prominent
CONJUNCTIVITIS — inflammation of conjunctiva
CONTRACTURE — permanent shortening of ligaments, joint capsule, and skin
DERMATITIS — inflammation of skin
EPIDERMIS — outer layer of skin
ERYTHEMA — redness of skin
ERYTHEMA NODOSUM LEPROSUM (ENL) — type of reaction in lepromatous leprosy
EXFOLIATIVE DERMATITIS — serious scaly skin inflammation, occasionally following DDS administration
EXPOSURE KERATITIS — inflammation of the cornea resulting when eyelids do not close properly
FOOT DROP — foot dropping downward from the ankle with each step
GLAUCOMA — eye disease, due to increased pressure inside the eyeball
GYNAECOMASTIA — abnormally increased development of male breasts
INFILTRATED — skin infiltrated, or invaded, by foreign substances or abnormal cells
KERATITIS — inflammation of cornea
LAGOPHTHALMOS — failure of eyelids to close the eye completely
MACULE — flat skin lesions with change of colour (Fig. 2.1)
MANAGEMENT — patient care
MORPHOLOGICAL INDEX (M.I.) — proportion of whole *M. leprae* present in a slide smear
MYCOBACTERIUM LEPRAE — acid fast mycobacterium causing leprosy (Hansen's)
NECROTISING — tissue in process of becoming dead
NERVE FIBRE — a single fibre carrying only one type of stimulus (microscopic)
NERVE TRUNK — a nerve enclosing huge numbers of individual nerve fibres (macroscopic)
OPACITY — lack of ability to transmit light (opposite of transparency)
PHOTOPHOBIA — fear of light
POLYMORPHIC — including many different shapes
REACTION — sudden change in body tissue already attacked by *M. leprae*
REJECTION — failure to accept
RELAPSE — disease returning or becoming worse
RESISTANCE — power of the body to fight infection
SCAR TISSUE — inelastic, contracting tissue which replaces normal tissue during healing
SPECTRUM — gradual change from one colour to another (e.g. rainbow) but also applied to types of leprosy
SYMMETRY — similarity of two sides of body (both arms, both legs, both sides of the trunk, etc.)
TEARING — excessive tears, or tears not held against the eyeball by eyelids
TRACHOMA — contagious granular inflammation of the conjunctiva
UVEITIS — inflammation of the iris and associated eye structures



